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LIVING IN THE AGE OF THE JERK

TECHNOLOGY INNOVATION,
PANDEMICS AND OUR FUTURE

JOIN THE DEBATE

LIVING IN THE AGE OF THE JERK

Technology innovation, pandemics and
our future Join the debate

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CONTENTS

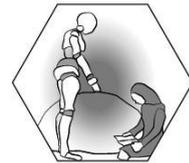
Introduction:	1
Prologue	11
Part 1 – The jerk	21
Chapter 1: Five industrial revolutions of fascism	23
Chapter 2: The augmented ape	43
Chapter 3: Why technology is jerking	55
Chapter 4: An age of plenty	79
Chapter 5: Technology cynicism and sudden change	113
Part 2 – Techopia	129
Chapter 6: The rise of the global citizen and the future of work in an age of plenty	131
Chapter 7: Totalitarianism and inequality	151
Chapter 8: Sloth and the end of empathy	173
Chapter 9: When virtual reality is better than reality	197
Chapter 10: When Orwell meets the fifth industrial revolution	209
Chapter 11: Homo sapiens augmented	233
Chapter 12: Conflict	237
Chapter 13: Collective intelligence	271
Part 3 – Utopia or dystopia?	287
Chapter 14: We need a wise crowd	289
Appendices	297
Biographies	305
References	307

Introduction

Within the lifetime of most readers of this book, technology will have changed humanity so much, that a case could be made for saying we are no longer the same species. The dangers, including a potential return of totalitarianism, are many. But, if we play it right, we could return to Eden, a technological Eden.

A perfect storm is brewing. Technology blows from the west. Fear of disease blows from the east. Circulating the world is the threat of climate change. Fascism threatens to add to the mix and rain upon us all. Never before has humanity been so close to descending into a dystopian nightmare.

Some storms never reach land. Technology could becalm the threat. Technology is set to change at a pace for which there is no precedent. This is simultaneously a fantastic opportunity and an insidious threat. Never before has humanity been so close to realising the dream of utopia.



As these words are written, the world is in the midst of its biggest extended crisis, triggered by a pandemic, since the Second World War. But before these words were written, it was apparent to all who observe these things that technology was set to embark on a period of extraordinary change.

Indeed, technology was and still is changing so fast that we say it is on the trajectory of the jerk. We shall explain what we mean shortly.



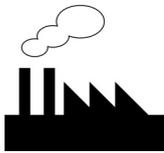
The Covid-19 crisis has added a whole new level of complication and danger.

The risk is that we become so focused on the threat of disease spreading across the globe, that we miss both the opportunity and challenge created by technology, like a character in a horror movie so preoccupied with the danger ahead that they forget to look behind.

The bad side of technology could combine with the very worst aspects of human nature to compound the danger. A return of fascism, disease even more deadly than Covid-19, social unrest on a massive scale, an end to privacy and a revolution or global conflict are among the dangers.

On the other hand, if we can all work together, learn from the lessons of history and act with reason, and openness, we can mould this technology revolution and turn it into something wonderful.

Approximately 250 years-ago, the world's population was around 700 million, and different peoples and places were strange, even mysterious. For most of these people, life was hard, short, and often miserable.



Then we experienced an industrial revolution, then we encountered another, and then eventually a third, and everything changed. Eventually, people became wealthier and healthier, but sometimes, in the immediate aftermath of an industrial revolution, the world descended into chaos.

Today, the world seems like a small place, people from across the planet watch the same movies, eat similar food, buy the same branded goods and often converse in the same language. Today, 7.5 billion people live on this planet, and thanks to the internet and other communication technologies these people are drawn together like never seen before – the family of humanity is becoming closer. It's as if we are becoming global citizens.

Yet, intolerance and conflict are never far away. We risk repeating the errors of history. Climate change and the problem of providing for today's global population is creating disease – Covid-19 will almost certainly not be the only health-related emergency to bestride the globe over the next decade or two. Lies go global. The message of hate charges social unrest. Pandemics threaten lives and our way of life. We look back to an older time that never existed, and long for a

more localised planet, where national identities are celebrated, lives were short and immersed in grinding poverty, wars between nations were more common, and except for the Black Death, and a very long list of other diseases that have changed the course of history, viruses didn't go global!

In so doing, we risk taking our eye off the ball. Technology creates both opportunity and danger. If we focus on the wrong risks, we risk missing the opportunity and only getting the downside.

We are at the beginning of two successive periods of innovation; a revolution of automation followed by a revolution of augmentation. The automation revolution has already begun, and it will continue for roughly ten years. During this period, we will see more technological change than we saw in the previous century.

The augmentation revolution will immediately follow, it may even overlap with the first period. Indeed, we would argue that this revolution has also already begun. It will be the most dramatic period of innovation ever.

Techopia — will technology create utopia or dystopia? It is up to us!

Consider three simple truths.

- Just about all change that has occurred over the last seven thousand years was in some way created by technology.
- But for us, our species, the human race, and our particular version of that species, *Homo sapiens sapiens*, has not changed; our DNA is almost identical to that of our ancestors from seven, twenty or even hundred thousand years ago. Society has changed massively; the economy has changed completely, culture is barely recognisable from a few centuries ago, let alone seven thousand years ago. But the bodies and brains we are born with are virtually unchanged.
- There is nothing new about accelerating technology and occasional periods when this acceleration accelerates. But the inevitable consequence of this is that we race ever more quickly to a new dawn — a dawn that could bring utopia or dystopia.



We are not equipped to deal with this change; neither are we given the cognitive abilities to understand it truly. But the change is occurring all the same. We can fight it, we can ignore it, we can retreat behind national borders, or we can sit back, and hope things will sort themselves out, but within those routes lies disaster. Or we can embrace it but with our eyes wide open, fully aware of the dangers.

There are eight ways this could pan out.



Technology may liberate us; free us to spend our time doing the things that matter, focus on our empathy and destroy the barriers that separate us. Television screenwriter and producer, Gene Roddenberry envisioned such a cultural and egalitarian society where scarcity is eliminated, and the peoples of the planet are united in the TV series Star Trek.

If we are not careful, we could lurch into a world of extreme inequality and risk the return of fascism. If you want to delve into fiction to imagine such a futuristic scenario, think of Star Wars, with the rule of the Sith and abject poverty alongside wealth.



Alternatively, computers, robots and other technologies will make our life too easy. Struggle and challenge are part of being human. We could be waited upon day and night by robot servants, creating a lazy, slothful society, that would horrify our ancestors. Like in the movie Wall-E, we lose our lust for life.



Or we could throw ourselves into computer games, escape into virtual reality, like in the movie The Matrix, where we would socialise in virtual space, maybe even holiday there. But is that desirable?



Or we could give up privacy, descend into a kind of police state, where our thoughts are no longer private, Big Brother is spying on us. An Orwellian world as portrayed in the book 1984.



Or technology may amplify us, turn us into bionic men and women, armed with enhanced intelligence, strength and health; as envisioned in the 1970s TV series; *The Six million-dollar man*.

Or we could head into conflict, world war, revolution or (less likely) face an existential threat from the machine; scenarios potentially found in films like *Apocalypse Now* or to the somewhat less probable *Terminator*.



Or we could unite, technology may bring us together, create an emergent system, charged by collective intelligence as envisioned by Isaac Asimov in the *Foundation Series* with *Gaia*, or by James Cameron when he created *Avatar*. Fiction has many such examples;

not all are benign.

In practice, these eight scenarios will overlap — we may never experience one such scenario to its extreme.

But within the lifetime of most people alive today, our fate will be inextricably sealed. We will be irreversibly heading for a specific combination of those scenarios.

The time for us all to take control and shape our fate to create the most benign outcome possible is now.

So who, what is this Jerk?

Imagine a car. If its speed increases from zero to sixty miles per hour in ten seconds, then from sixty to 120 mph in twenty seconds, it is accelerating. Now consider a rocket and imagine that, at first, its acceleration is quite slow as it lifts off its launcher, then it accelerates at a faster rate. It takes a few minutes before acceleration peaks. This is a Jerk. It refers to the acceleration of acceleration.

It is also possible to have a negative jerk; this describes the rapid reversal of acceleration. For example, from your speeding car travelling at 100 kph, you spot a traffic jam ahead, and you slam on the brakes.

Unfortunately, you skid into the vehicle in front and reach an abrupt halt. This would be a negative jerk.

People often say technology is accelerating. We disagree; it is more than that. Right now, it is accelerating at an accelerating rate; it is jerking.

You can go back further; the jerk describes evolution too. Life began almost four billion years ago, and at first, things changed very, very slowly. Roughly 1.8 billion years ago, the first complex organism evolved, and evolution accelerated. Approximately 535 million years ago, we saw another significant change, something those who study evolution call the Cambrian explosion – the acceleration of evolution accelerated – or as we like to say, it jerked.

Of course, there were occasions when things went into a sharp reversal. There was a negative jerk when the meteorite wiped out the dinosaurs. But this soon changed to a positive jerk, as the vacuum created by the end of the dinosaurs created an opportunity for mammals. There was an explosion in activity as evolution accelerated, but at a rate that was much faster than before the meteorite.

When nature created an ape that talked, we saw another type of evolution: a cultural/technology evolution, and ever since then, change in culture and technology has accelerated.

Now and again, something big happened, and with that, this acceleration accelerated. It happened when our early ancestors learned how to write, which triggered a rush of new innovations. It happened again with the invention of the printing press. In its wake, we saw civil wars, revolutions, and industrial revolutions.

Most recently it happened with the internet and world wide web. It will happen again with augmented and virtual reality, enhanced by artificial intelligence, (AI) new communication channels like nothing we have seen before.

Take a look at the last two or three hundred years, and you will find that there have been a series of industrial revolutions, each one creating a new jerk. Some of these industrial revolutions were followed by an economic boom, a period of rising prosperity. Others were followed by economic hardship, the rise of totalitarian governments, and world war. Sometimes we saw an actual revolution.

This book focuses on what we call the Fifth Industrial Revolution, in which we will experience the acceleration of the fourth industrial

“We shall escape the absurdity of growing a whole chicken in order to eat the breast or wing, by growing these parts separately under a suitable medium. Synthetic food will, of course, also be used in the future. Nor need the pleasures of the table be banished. The new foods will be practically indistinguishable from the natural products from the outset, and any changes will be so gradual as to escape observation.” –

Winston Churchill, The Strand Magazine 1931

For many ages to come, the old Adam will be so strong in us that everybody will need to do some work if he is to be contented. We shall do more things for ourselves than is usual with the rich to-day, only too glad to have small duties and tasks and routines. But beyond this, we shall endeavour to spread the bread thin on the butter-to make what work there is still to be done to be as widely shared as possible. Three-hour shifts or a fifteen-hour week may put off the problem for a great while. For three hours a day is quite enough to satisfy the old Adam in most of us! – **John Maynard Keynes, Economic Possibilities for our Grandchildren (1930)**

The power of exponential

Put an imaginary grain of rice on a metaphorical chessboard. Then two on the second square, four on the third, eight on the fourth, etcetera. By the end of the first row, you will have 256 grains. By the end of row two 64,000 grains, and by the end of the chessboard you will have 18,446,744,073,709,551,616 grains.

That is when it gets interesting. Because if you were to then grab a second metaphorical chessboard, by the middle of the first row of the second chessboard, you would need a container the size of the Earth to contain all the rice. By the third row of the second chessboard, you would need a container one cubic light-second in size.

By the end of the fourth row of the fifth chessboard, you would need a container the size of the observable universe, and a few squares later a container the size of the universe.

Now imagine a computer that doubles in power every six to twelve months. With quantum computers, this exponential rate may even increase. Imagine that!

Prologue

Technology liberates, and it enslaves. It can create inequality leading to social unrest, fashioning the conditions that lead to the rise of fascism, but it can also enlighten and reduce poverty.

Occasionally, in the story of humanity, something remarkable happens, and it changes the world. The change is not always for the better, but it is undoubtedly dramatic. Such changes are rare, indeed. During the lifetime of most readers of this book, we won't merely see a single development that will profoundly transform the world. Instead, we will see many.

Consider the checklist of such breakthroughs seen in the past – learning how to make fire, development of agriculture, the discovery of electricity and how to harness it. Maybe we could include the discovery of penicillin in this list. Other innovations have been catalysts, for change for example, the invention of writing, or the printing press. You may be able to think of a few more examples, but there are not many.

The latter years of the 20th Century saw another – the Internet. The technology itself didn't physically produce much utility – not like fire or electricity, but just like the invention of writing and the printing press, it spreads ideas, it mixes them and enables change.

If the printing press was the catalyst of religious and industrial reform, leading not only to industrial revolutions, but bloody revolutions too, the internet is having an even more profound impact. What is so remarkable about the age we are living in is that we are set to see several advances, each on its own sufficient to create seismic change.

There is artificial intelligence (AI), genome sequencing, a DNA editing tool known as CRISPR/cas9, quantum computing, augmented and virtual reality, stem cell research and nanotechnology. Applications that are emerging include real-time language translation, AI-based personal assistants that will support us, augment us, challenge us and maybe nudge us. Other technologies relating to neural science may actually enhance our brain. They provide interfaces directly from brain to computer, or even read our minds and they may have an even more profound impact.

What are the implications? They are as far-reaching as you can imagine.

The Covid-effect

Without the Covid-19 crisis, both the public and private sector were going to adopt the revolutionary digital technologies. However, there were barriers to this adoption. Public attitudes were often cautious, driven by a fear of change, a desire to protect the known. Businesses, often encumbered with a legacy of processes that were hard to change, were being dragged into this new technology age. ¹

Covid-19 and lockdowns have forced these changes upon us more rapidly. Many people have found these technology changes not as onerous as anticipated. Remote working has been tried at scale – and for its users, it was not as bad as expected. Virtual meetings and even virtual conferences have become everyday routine – and many have been surprised by how painless this way of working is. Others have been forced to apply more automation – it will be hard to reverse this change. More consumers bought products online and found themselves asking why they hadn't done this before. Families and friends, unable to meet in person, experienced online video communication – they had no idea how fun it would be.

There is another side to the crisis. The virus discriminated – it seemed to be more deadly to people from poorer backgrounds, poorer health and across much of the West to people of ethnic minorities. ²

¹ *Xiao and Fan*

² *Public Health England, Beyond the data: Understanding the impact of COVID-19 on BAME groups*

The crisis also highlighted how the workers who provide essential services are often poorly paid. It became clear that many roles that pay high salaries were of far less social importance.

The economic hit created by Covid-19 may exacerbate inequality even further.

The role of technology

History shows, what to many people is intuitively apparent, that technology creates wealth. Before the era of industrial revolutions that began between 200 and 300 years ago, economic growth per person was tiny. Before these revolutions, most people lived in a kind of grinding poverty. The era of industrial revolutions was accompanied by massive increases in population, but income per person grew even faster. GDP per capita in 1760 was roughly \$1,803 measured in 1992 purchasing power. GDP per capita in the UK today is roughly nine-times higher than in 1760 after allowing for inflation.^{3 4}

But the impact of these industrial revolutions was not always benign.⁵ It seems that the 19th Century saw increased inequality and the benefits from technology did not always trickle down into improved wealth, and indeed health, for ordinary folk.

Other technologies such as the printing press sowed the spread of ideas – propelled innovation and probably culture. The printing press is regarded as a critical driver of the Renaissance as well as new religious beliefs.⁶

But while the outcomes of this spread of ideas were often positive, it also led (for better or worse) to revolutions and conflict, both within and between nations.

New technologies may have been key drivers in leading to the world wars of the 20th Century. New technologies certainly made the world seem like a smaller place and conflicts that may have been

³ Roderick Floud, Paul Johnson, *The Cambridge Economic History of Modern Britain: Volume 1*

⁴ Max Roser, *GDP per capita in England*

⁵ Graeme Snooks, *Was the Industrial Revolution Necessary?*

⁶ Rita Santillan, *The effect of the printing press in the Renaissance in the 15th century, Italy*

regional in the past have scaled and become global. Technology has also fashioned terrifying new weapons.

The most significant age of innovation experienced to date ended around 1914.⁷ With it, an age sometimes called the first age of globalisation ended too.⁸ In the aftermath of the First World War, the world drew in on itself. The Treaty of Versailles was based on the principle that Germany must pay for its role in the war. Global institutions such as the League of Nations were given limited support. The US, for example, never joined. Nor did many other major globally significant players. In 1929, the Wall Street crash heralded the start of the Great Depression in the US. In 1930, the US introduced the Smoot Hawley Tariff Act,⁹ which imposed tariffs on 20,000 goods imported into the US.

The world reacted to the challenges of the post First World War era by engaging in self-defeating behaviour. Although fascism took root in Germany and Italy with disastrous consequences, it drew popular support across much of the world, including the UK and US. And the world experienced its Second World War.

After the Second World War, the Marshall Plan provided enormous economic support to war-ravaged Europe, especially Germany. It was the antithesis of the Treaty of Versailles

Other international institutions such as the European Coal and Steel Community, (forerunner of the EU), the UN and the General Agreement on Tariffs and Trade (GATT), the predecessor of the WTO were formed, and The Universal Declaration of Human Rights was agreed. The WHO can trace its origins back to before this time, but it wasn't until after the Second World War that it became more influential.

These international bodies helped create stability. The significant innovations of Victorian Times and of the early 20th Century finally began to be fully utilised, and the so-called advanced world enjoyed its strongest quarter of a century of growth ever recorded. Inequality fell too.

⁷ *Smil, Vaclav. Creating the Twentieth Century: Technical*

⁸ *Stephen D King, Grave new world*

⁹ *The battle of Smoot-Hawley: The Economist*

When, by the mid-1970s, the West had finally managed to fulfil most of the potential productivity created by the innovations of the past, economic growth slowed, inequality increased, and politics shifted towards the right.

Then in 2008, the global economy saw a crash that brought back memories of 1929. Many feared a repeat of the disaster that was the 1930s. This fate was avoided, but only to an extent, as economic policymakers papered over the cracks that had been emerging since the mid-1970s. Central banks reacted to a crisis that was caused by too much debt, by cutting interest rates, leading to more debt. The issue of inequality was not dealt with and has grown deeper over the last decade. Widespread anger has grown with it. When the Second World War came to an end, the response was different. Politicians and their advisors developed ideas that applied the lessons of Post First World War. In 1944, at Bretton Woods, a new international economic framework was conceived. It created a system for managing international trade and the flow of money, and the IMF and World Bank were formed.

Before the Covid crisis, the authors already feared a possible return of fascism, especially if new technologies were allowed to develop in such a way as to create even more inequality.

The Covid crisis has exacerbated this danger.

We are also witnessing a backlash against globalisation, a growing view that China must be made to pay, bringing back memories of the Treaty of Versailles, the undermining of global institutions such as WHO, WTO and EU and a growing protectionist sentiment.

Such movements threaten to repeat the economic nightmare that was the 1930s. The possibility of an outcome of social unrest and conflict should be terrifying.

Other Threats

The occurrence of viruses spreading across the world, claiming millions of lives, predates modern technologies and modern globalisation by thousands of years. The Black Death is an obvious example – responsible for 200 million deaths at a time when the global population was a fraction of the current size.

And such viruses can spread from West to East or vice versa, or indeed from West and then around the world. The reason, for example, why both Cortes and Pizarro were able to respectfully conquer the Aztecs and Incas, each with a small band of men, was in large part due to the spread of Smallpox and Measles brought in by the Europeans¹⁰

If you want to look for something or someone to blame for viruses spreading out, claiming vast numbers of lives, blame the invention of agriculture seven or so thousand years ago, which led to a closer mingling of people and animals and was also associated with rapidly growing human populations. Before agriculture, we were typically healthier (we were undoubtedly taller), but because hunter-gatherers societies are quite good at limiting population growth, they have often been conquered by agricultural communities primarily because of their greater numerosity.

Today, climate change and population growth pressures mean that humans and the rest of the animal kingdom are encroaching on each other's turf, creating strains that foster the evolution of new diseases. As a consequence of this, Covid-19 is just one example of a Coronavirus that has spread globally this Century – both SARS and MERS, being other examples.

And more will follow. The Covid-19 outbreak was not a once in 100-year event. It was the first event of that scale in 100 years but is likely to be followed by many more such occurrences.

Yet, new Coronaviruses do not pose the greatest disease-related threats to humanity during this half of the 21st Century. We have been busily enabling more dangerous threats from bugs caused by over-use of antibiotics.

It has been estimated that the accidental discovery of penicillin in 1928 by Alexander Fleming saved between 80 million and 200 million lives.¹¹

Subsequent overuse of antibiotics, especially its indiscriminate use within agriculture, threatens to destroy their effectiveness, and given that the entire global population today is over seven billion, meaning as many people are vulnerable to superbugs, the loss of such effectiveness could claim hundreds of millions of lives.

¹⁰ Jared Diamond: *Guns, Germs and Steel*

¹¹ *Bacteria in Photos*,

Technology and globalisation provide the fix

However, the end of effective antibiotics does not represent the biggest threat to humanity this century.

We should consider climate change, over fishing, plastic pollution; the list is long

However, it is technology which poses the greatest long-term threat, because it is changing so fast – accelerating at an accelerating rate, jerking – disrupting all in its path risking a dystopian world, the stuff of nightmares.

Although rapidly changing technology poses enormous risks, it also represents an extraordinary opportunity.

Technologies such as renewable energy, energy storage and new ways to create food using less land and water can simultaneously allow us to defeat climate change whilst creating an age of plenty – where no one should experience poverty.

Technologies provides our only hope of winning the war against disease.

The good news is that technologies are developing that can indeed win these wars. But the advancement of such technologies requires global cooperation. China, for example, is becoming a key player in the development of technology. A Chinese company is working on a battery for an electric car that could have a lifetime of 100 million miles.¹² Chinese companies are also radically transforming the solar power industry,¹³ while in the field of healthcare, Chinese companies are collaborating with firms from both East and West to create new antibiotics or alternative treatments to superbugs.¹⁴

If we were to attempt to ostracise China from the global economy, as we did with Germany, post First World War, we are very likely to punish ourselves. But for technology to benefit us all, we need globalisation for another reason. Technology advances often follow a course known as a learning rate – as total production of a technology increases its cost falls, and its sophistication advances.

¹² *Bloomberg News, Chinese giant that powers Tesla says it has million-mile electric-car battery ready to launch*

¹³ *Charlotte Edmond, China's lead in the global solar race - at a glance*

¹⁴ *Michael Berger, An alternative to antibiotics - weakening superbugs' grip*

To understand a learning rate, we can turn to an American aeronautical engineer of the early 20th Century, Theodore Paul Wright. To cite, Ramez Naam, an expert on the disruptive compact of renewables, “Wright observed that every doubling of production of US aircraft brought down prices by 13%.”¹⁵

This is known as Wright’s Law.

Computer power advances, the falling cost of energy renewables and storage and genome sequencing are all experiencing learning rates. With computer processing power, the learning rate is also called Moore’s Law. Learning rates apply in other areas – such as stem cell research or editing DNA. The greater the size of the market for these technologies, the greater the scope for the learning rate to make the technologies affordable for ordinary people.

We need a global market for technologies in order to make them at scale. To defeat climate change and hunger and plastic pollution, we need a global market for the technologies that can help us achieve these victories.

This is global market that must include China, especially as it seems set to become the largest economy in the world.

The Danger of Groupthink

The internet and burgeoning communication technologies such as virtual and augmented reality supported by AI, could eventually enlighten us and bring us closer together.

But they carry risks too. Among those risks are groupthink and linked to that group polarization.¹⁶

All of us are inclined to comply with the group that we attach ourselves too. Our inbuilt biases mean we latch onto ideas that support preconceived notions. When these tendencies are multiplied out across large numbers of people, we get groupthink.

Groups can behave like they have a kind of collective conscience (they don’t, but it is as if they do.) Group polarisation occurs when a group exaggerates the views of a majority – for example, a group of people who are, on an individual basis, mildly inclined to take

¹⁵ Naam, Ramaz: How to decarbonize America

¹⁶ Stone, James A. F.; *Risky and cautious shifts in group decisions*

the odd calculated risk, can become reckless in the extreme. New communication technologies will exaggerate this risk further still.

We need education that can teach us how to make technology enhance us, become a purveyor of factual information and enlighten us. We also need education to teach us how to rise above groupthink so that it does not corrupt us. Group dynamics can create great insights, but they can be enormously dangerous. In the past, groupthink has fostered intolerance, the rise of fascism and conflict.

Wisdom of the crowds

While groupthink can be dangerous, crowds can also be extraordinarily clever and wise.

We recommend that the solution to the challenges described here require the wisdom of crowds.

But a pivotal prerequisite to creating a wise crowd and not one riddled with dangerous groupthink is diversity.

We don't only need a wise crowd; we need a gender, racially and culturally diverse crowd.

The issues described in this book are just about the most important questions there are.

And these are way too important for us to leave it to the politicians, academics and entrepreneurs to figure out a response, a solution.

If we play this right, we could be no more than a few decades from living in a form of utopia.

We could return to a kind of Eden, a digital Eden, and realise the advantages that were ours before agriculture changed us, but combine it with technology too, and see extra benefits. However, if we play it wrong, dystopia beckons.

And all of us must engage in the debate. We must take ownership of our future and that of future generations. It is the most critical debate there will ever be, and the answer does not solely lie with academics, or intellectuals, or all the people who frequent the Annual World Economic Forum at Davos for example, who consider themselves to be deep thinkers.

The responsibility lies with us all; the wisdom of the crowd holds the answer. That means you and me.

Part 1

The Jerk