TECHNOLOGY TSUNAMI ALERT
YOUR GUIDE TO FUTURE TECHNOLOGICAL CHANGE AND HOW TO EMERGE A WINNER.

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Protect your children, family and business

PROLOGUE/PRELUDE

My interest in futurism began soon after Nokia, Eriksson and Kodak collapsed. In my opinion, Nokia and Eriksson failed mainly because they did not adopt bigger glass screens. Kodak invented the digital camera but stuck with film too long. Fortunately, I was not invested in these companies, but I had to ask myself, "If such big companies can fail so quickly due to changes in technology, how do we avoid the losers and pick the investment winners of the future". I concluded that successful investors had to have some idea of how the economic and industrial playing field is changing if they were to have any chance of choosing "safer" investment strategies. More importantly, one had to invest in new technology leaders, not followers.

I started by subscribing to a futurism publication, reading numerous futurism books and perusing countless articles on the internet. In addition, I attended numerous talks, including some from Singularity University of California, which promotes futurism, and endlessly watched YouTube clips and other recorded talks on a wide range of topics. Fortunately, I found it all very fascinating and became totally immersed in this emerging "wonder-world" of exponential technological change. More importantly, I got a glimpse of just how rapid, comprehensive and disruptive the transition was going to be. Most important, I realised that understanding this "in time" could help one take pre-emptive action to mitigate the disruption. It was then that I got a growing urge to share it with others.

What was most fascinating was the all-encompassing breadth and depth of the looming disruption to our lives, and the rate of change, which is accelerating to the point where we will struggle to keep up in the next decade. While it may seem frightening, because people often focus on the overhyped negatives like the threat of rising unemployment, it is more likely to be extremely positive in the longer run. Regrettably, such major transitions never happen without some pain in the shorter term. The real question that will emerge from self-reflection after reading this book is, "Are you going to be one of those who prosper because you embraced change, or are you going to be disadvantaged because you were reluctant to do so"?

INTRODUCTION

Change is now accelerating so rapidly that the experts estimate the world will probably see more change in the next 20 years than we saw in the past 2000 years, and I believe it. The most important concepts to take away from this is that "absolutely everything" in our lives is going to change so radically by 2030 – 2035, that you will hardly recognise our world. Anticipating that change is the art/science of Futurism. So, what is Futurism? My definition is as follows:

Futurism is the art/science of evaluating actual and emerging trends in all spheres of life, including the disruptive consequences of the convergence of countless technologies and trends, for the next 10, 20, even 30 years, evaluating all the risks and opportunities, and then   <u>choosing a better future.</u>

However, it is important to note that most "foreseen" changes frequently beget countless "unforeseen" changes, such as that Digital Phones morphed into infinitely versatile Smart Phones that put the world in your pocket. Therefore, Futurism not only about being prepared for the future, but also about being willing to adapt whenever life/technology throws you a curved ball.

Ideally everyone needs to urgently embrace Futurism as you need to understand the impact that accelerating change, disruptive technologies and other trends will have on your Children, Family, Lifestyle, Business, Customers, Wealth, Society and Country. The winners of the future will be those who choose to embrace change and adopt a new approach to life now, or by the latest 2025. I picked that date because 2030 could be too late. Regardless of the date, the longer we wait, the greater the risk that our future could be mediocre or even relatively regressive, instead of splendid.

This book is about the future, so please do not relate the revelations in this book to where we are now. Rather keep imagining where we are most likely going to be in a decade, because the purpose of this book is to show you what our world may look like in 2030 – 2035, inter alia:
➢ To convey just how unbelievably rapidly the future is going to change, how all-encompassing that change will be and how unimaginably disruptive it will be to everything you know and hold dear.
➢ To convey concepts, not details. Concepts create the life changing picture, whereas details can distract from that message, so please do not dwell on the details as these keep changing.
➢ Not to give you all the answers, but to give you a broad overview and bring about a realisation of just how radical the breadth and rate of change will be.
➢ Not to tell you what to do, but to reveal some of the tools you will need to cope with the disruption. NB! It will disrupt your life far sooner than you think.
➢ To get you to say – "my life, children, family and business will benefit if I understand this space better" and get you to actively engage in, and/or delve deeper into this topic.
➢ To bring about the realisation that Futurism is very interesting and exciting. However, please remember that Futurism is about probabilities. It may not be right on everything, but it will be right on almost everything. It may not get the timing exactly right, but it will be close, and most things will probably happen sooner.
➢ To get you to start Googling and YouTube-ing and start your own journey of discovery, since that is far more convincing at a personalised level.

There are a few problems with tackling such a broad and complex topic in a single book, because:
➢ Pursuing a topic this broad is complicated by the fact that breakthroughs are happening daily, which means a cut-off had to happen at some point, where-after the publication process started.
➢ The scope of this book is so broad, that it is not possible to cover all the technological breakthroughs that are happening around the world today and certainly not in any detail.

Therefore, you will no doubt think of things you feel I should have included in this book, but do not let that distract you from the overall message, which is the breadth and depth of the disruption.

➢ Disruption is caused by the convergence of "multiple" technologies, which means I end up with a "chicken and egg" situation, in that terms and concepts need to be introduced before they are explored in greater depth in later chapters. Therefore, I recommend that you first skip through the chapter headings in the table of contents, so that you get a sense of the scope of this book and know that some of the terms and concepts, like Blockchain (the last chapter), will become clearer as you progress through the book. I have also provided a list of definitions, or should I say explained some terms, at the back.

➢ Any technology has both upside and downside. I had to choose which side to go with. I chose to focus on the upside, because together we can use technology to "choose a better future", while sidestepping or managing the downside, as we humans always have.

➢ I chose a sequence of introduction of topics that would lay sufficient foundation for subsequent topics and keep you interested. Because of this and my "Chicken and egg" dilemma", there is sometimes an unavoidable duplication of concepts, which I tried to keep to a minimum.

You may already have some or considerable familiarity with one or two of the future developments covered in this book, but I am confident that you will find far more that you do not know, than that which you do. Although it may be tempting to skip chapters that are of less interest to you, it is preferable that you read, or skip through them, especially the shorter ones, as they lay the foundation for those that follow. For example, the chapter on business, towards the end, makes more sense if you have read all the preceding chapters.

I started researching this topic in 2012, started the book late in 2018 and finished it early 2019. Allowing for the time taken from editing to publication, which usually takes up to 12 months and could take me into 2020, quite a bit may have changed because technology is changing so fast. However, that would mostly be in the detail rather than the broad concepts.

I tried to keep the paragraphs and chapters short, for quick and easy reading, which meant I had to split a few very diverse topics across two or more chapters. For example: Medicine has probably embraced Futurism more than any other discipline, in that it has embraced multiple disruptive technologies in every discipline and aspect of medical care. Although many other industries have also embraced Futurism to a greater of lesser extent, I have chosen to elaborate on Medicine in particular, since we all have a considerable vested interest in it. I have split this across four chapters.

Throughout, I have mostly chosen to write the Technology words as Proper, with the first letter capitalised, to emphasise these. I have also frequently used the words "you", "we" and "us", in that I feel it is we as the whole human race who have collectively evolved technology and progressed.

The first chapter provides an overview of some of the key concepts, which are then discussed in greater detail in subsequent chapters.

CHAPTER 1
OUR RAPIDLY CHANGING WORLD

Futurism is the art/science of evaluating actual and emerging trends in all spheres of life, including the disruptive consequences of the convergence of countless technologies and trends, for the next 10, 20, even 30 years, evaluating all the risks and opportunities, and then   choosing a better future.

Ideally everyone needs to urgently embrace Futurism as you need to understand the impact accelerating change, disruptive technologies and other trends will have on your Children, Family, Lifestyle, Wealth, Society, Business, Customers and Country. The winners of the future will be those who choose to embrace change and adopt a new approach to life now, or by the latest 2025. I picked that date because 2030 could be too late. Regardless of the date, the longer we wait, the greater the risk that our future will be mediocre or even relatively regressive.

Technology Tsunami Alert will help you become "antifragile" so that you may prosper into the future. Nicholas Taleb coined this very important concept. Something that is fragile, breaks when things go wrong. Contrarily, if you are antifragile, you not only survive crises, you emerge stronger than before, which is the essence of essence of "survival of the fittest in nature". For example: If you adopt the right strategies you can make money during the next stock market crash, instead of losing it. This book will make you aware of the coming disruption and enable you to adopt strategies that will help you and yours prosper rather than suffer disruption.

Exponential change
Few realise how fast our world is changing, but it is "critical" that you understand this. To put the "sheer power" of exponentially accelerating change in perspective, let us use an illustration. We can all imagine how far "30 steps" would take us. Now try to imagine how far "30 exponential steps" would take you, where each step you take is twice as big as the previous step, namely 1, 2, 4, 8, 16, 32 paces and so on. By the time you complete the 30th step you will have taken more than a billion paces and have circumnavigated the world about 20 times, or 25 times if your steps were 1metre. This is why the world was fearful when the Coronavirus cases were doubling daily and weekly, because that suggested it was spreading exponentially and that a billion cases were not far off. It also explains why some modern tech entrepreneurs like Elon Musk were so successful. The biggest factor is probably that they understand the power of exponential growth. I can already hear you say "what do you mean?" Well, instead of competing with other companies, they create or exploit new technologies that will a) make their competitors' products obsolete, and b) enable them to exploit the power of exponential growth.

Now apply this "incremental steps" concept to annual leaps in technology, that are constantly becoming bigger and happening faster, as performance efficiencies and/or capabilities tend to double every two years. If our innovation and knowledge is doubling every 2 years, think where we will be in 15 years. Both humans and businesses will increasingly struggle to keep up with accelerating change. I cannot stress enough how quickly all this change is going to be upon us and how radical it will be, something I try to convey in the rest of this book.

The chart below and the following explanation will help to put this in perspective.
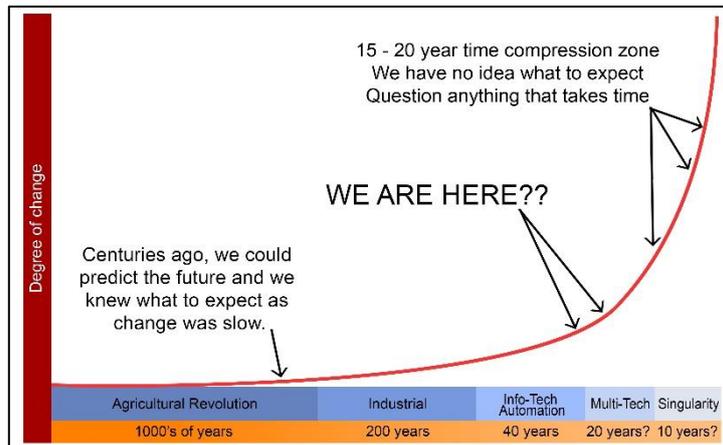
During the agricultural and industrial revolutions, shown above, change was slow enough that we could predict the future and adapt generation by generation. During the IT revolution change was faster, but we could adapt over a period of a few years. During this early stage of the multi-tech revolution, change is happening so rapidly that we can barely keep up. The last "Singularity" phase has been defined by experts as the point at which Artificial Intelligence equals humans. Currently it is estimated that Artificial Intelligence will overtake most of our human abilities between 2035 and 2045 – yes within your lifetime. At that point, computers will do everything we do, but a billion times faster, and it will become increasingly difficult to keep up, as technology will advance faster than people or industry can adapt.

Time compression
The exponential curve also illustrates that we are entering a time compression phase where change is happening faster and faster. In business today, the time between conceptualisation and commercialisation keeps shrinking to the point where it is now often takes less than a year to conceptualise, design and launch a radically new product. Soon knowledge, products and services will double every few months, or weeks. At some point, in the near future, it will be impossible for us to keep abreast of change and assimilate the growing body of knowledge. This suggests that we will need coping tools that present the right information as and when we need it.

In the "production" environment time will become progressively less important. This is because tasks that initially appear to be too slow or complicated to be commercially viable, will eventually be accelerated by way of Algorithms, Automation, Robotics and Artificial Intelligence (AI). We saw this with computer chip production, which is now done rapidly at near atomic scale. These technologies also allow for parallel production on a massive scale as 1 robot can make 2, 2 can make 4, 4 can make 8, and so we go exponential again until we have 4 billion robots after 32 cycles.

Growing future uncertainty
One of the difficulties associated with this accelerating rate of change is that it will also become increasingly difficult to predict the future. You can often see where a technology is going, but it is difficult to predict how quickly it will be adopted, how many industries will find it useful, or how it will metamorphose during its development. For example, in 1985, AT&T asked McKinsey to predict how big the "then bulky" mobile phone market would be in the year 2000. The answer was 900,000 and the reality was 109 million. Getting the numbers so wrong was one thing, but who could have predicted that this humble telephonic device would shrink and then evolve into a "Smartphone" with unlimited applications and powers. Bottom line almost everything is happening faster than we anticipate and the change is more radical.

Inevitable choice

For the majority, it is a human failing that we resist change, mostly because the thought of being out of control is terrifying. This is counterintuitive as change is constant in this world of ours. Furthermore, there is no "end point" to continuous accelerating technological change and so we need to accept that we will continually be off balance and seeking a new elusive equilibrium point. Considering the accelerating rate of change of technology, "uncertainty" and "being out of our depth" are a future given. Therefore, we should embrace these. Accordingly, "adaptability", which equates to learning to embrace and love the adventure promised by uncertainty, change and being out of control, will be a future asset. Think about it like this: resisting change is about trying to maintain the boring status quo, which equates to "merely existing", whereas embracing change equates to the continuous adrenalin rush of "living life to the full and on the edge".

We will spend the rest of our lives in this rapidly changing and increasingly unpredictable future, which is why it is pertinent, and why we should take all this seriously. Essentially, it is presenting you with the one of two choices, as illustrated in the graphic below. If you choose to resist change and stick with the red line, you will experience increasing stress brought on by disruption. Alternatively, if you choose to adapt, embrace change and stick with the yellow line, you will have far less stress and more opportunities.
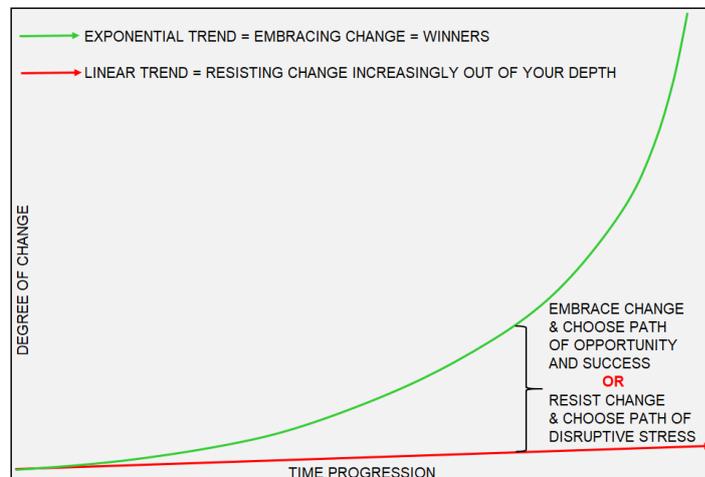
Disruption

So, now that we grasp the power of exponential change and the need to take it seriously, the next important concept to grasp is that of "Disruption", because Disruption is about to become the norm. Please note that innovation is more about doing the same things better, whereas disruption is about creating completely new things or ways of doing things, that make old things obsolete. In fact, disruption has two faces. It disrupts on the one hand, but that disruption is only made possible because we have embraced that which made our lives easier or better.   i.e. We facilitated/encouraged it. Tony Seba, world renowned speaker and prolific writer of books on technological change, suggests that disruption occurs every time multiple technologies and/or trends, coupled with business model innovation, converge to create new products, services, markets, or industries, that were mostly not possible before and/or change/transform the way we do things.

Disruption presents both threats, as we saw with Nokia and Kodak, and opportunities, as is evidenced by countless IT billionaires. We will see more of this, because by 2030, most predictable, logical, repetitive and boring jobs will be replaced by disruptions in countless industries. These will arise from the convergence of technologies such as Automation and Robotics coupled with Digitalisation and Artificial Intelligence, to name but a few. I illustrate this by way of example in the next chapter, where I elaborate on the full extent of technological disruption in only one industry.

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This does not mean that we will be out of work, as future technologies need people to implement them, but those who are about to lose their jobs are mostly not skilled for the jobs of the future. While this brings opportunities in education, the exploding list of new technologies, coupled with the accelerating rate of change, also suggests that our children urgently need a revised curriculum that teaches new skills. Furthermore, we need an education system that can be adapted almost continuously, which will make it difficult, or virtually impossible, for teachers to keep up. More about this in a later chapter.

Currently there are about 30 massively disruptive technological forces on the horizon, each of which is still in its infancy and will reach maturity in the next 5 – 10 years. In fact, by then there will probably be more. Each of these will disrupt our lives, various industry sectors, economic models, economic statistics, tax revenues and the employment arena, to name but a few.

Digitalisation, Dematerialisation and Demonetisation
Three important concepts facilitating disruption that we need to grasp are those of the Digitalisation, Dematerialisation and Demonetisation of almost everything. Digitalisation and Dematerialisation are happening as everything goes digital. Think of how books, music, movies, encyclopaedias, healthcare, banking and the like, have mostly moved onto your Smartphone or Smartwatch. Demonetisation is happening as everything becomes cheaper or free. Think of the above listand of apps like WhatsApp, Netflix, Airbnb and Uber. All this is very disruptive for business.

Moving towards a better future
It is important to realise that the future is probably going to be better than the past as we will not be trapped in boring and repetitive jobs, which means we will be free to pursue more challenging careers. Most likely this era will also be one of "Abundance", the title of a book by Peter Diamandis, where the poor in particular will have affordable access to clean water, more food and better sanitation, health care, connectivity, communication and education, by about 2030/35. I am not suggesting they will no longer be poor, merely that their plight will no longer be quite as desperate and that they will be able to shift their focus from survival to self-betterment. However, on a global scale, most of our basic needs will be taken care of and we will be able to move up Maslow's hierarchy of needs, shown below, progressively moving ever closer to Self-Actualisation. Routine physical work will increasingly become automated and we will increasingly be engaged in work requiring intellectual or hyper human skills. Therefore, I suspect we will re-connect with being "human" in this age of technological change.
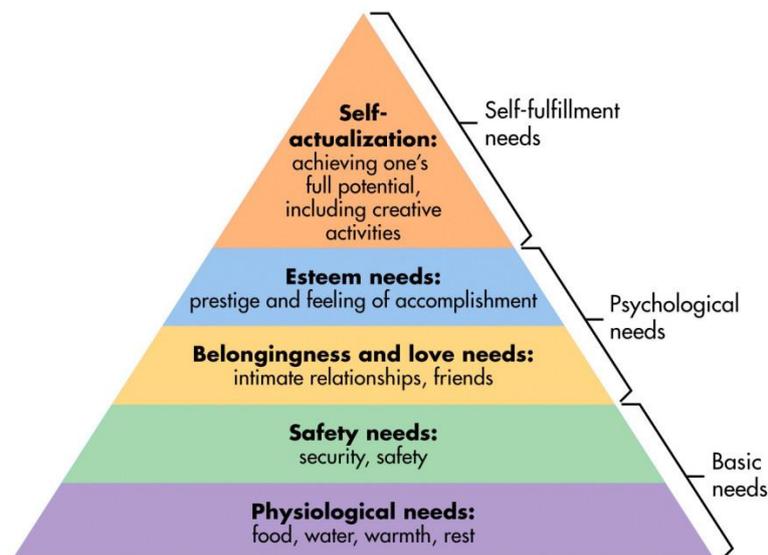
The important point here is that technology will continually be giving us new tools, but we will need to figure out how to use them with perspective to make us better people, with better values and better lives.

Technology outpaces regulation
One of the biggest problems with the increasing rate of change is that we cannot always anticipate all the new technologies, let alone the consequential uses and abuses of any new technologies. Accordingly, one of the areas that will be the most difficult to manage is regulation, because ever quicker adoption will increasingly, and then inevitably, precede regulation. Therefore, ideally in this new world, regulation should start with self-regulation guided by business ethics, conscience and self-control at the individual level. We saw an illustration of this with Facebook. In this regard, these quotes paraphrased from James Faust come to mind:

" Our increased reliance on laws to regulate human behaviour is a measure of how uncivilised we've become"
… or, stated differently, …
"The lack of internal control by individuals breeds external control by governments"
… however, …
"Policemen and laws can never replace customs, traditions and moral values as a means for regulating human behaviour. At best, the police and criminal justice system are the last desperate line of defence for a civilised society".

If we are going to avoid lawlessness and chaos in this future world, we need to become more civilised, starting with putting honesty and integrity first. Fortunately, with digitalisation, coupled with technology that tracks everything, and software that allows us to rate anything, we are moving into an era where our actions will be increasingly transparent. This will make honesty the logical personal choice in the not too distant future. It also appears that the millennials, who are more aware of the world's inconsistencies thanks to perpetual connectivity, are aware of this.

Democratisation
William Gibson said, "The future is already here, it is just not even distributed". Another problem that we really need to guard against, is that the adoption of these disruptive technologies and the appropriate strategies to cope in this rapidly changing world will almost certainly lag in developing countries, poorer schools and less educated societies. This would increase the gap between the haves and the have not's, between the rich and the poor, which would foster growing dissatisfaction and be a massively destabilising influence for our general safety and security. Therefore, we need to ensure these disruptive technologies are "Democratised" so that "all" people benefit equally and simultaneously.   Fortunately, most of the pioneers developing these future technologies are extremely aware of this and have fostered a culture where they actively promote the "Democratisation" of their respective technologies. This is hugely facilitated by the Digitalisation, Dematerialisation and Demonetisation trends which enable us to make most technologies accessible to all, very affordably and/or free, even to those in isolated places. This is our chance to make the world a better place. Let us make this happen. More about this later.

One of the biggest threats to the Democratisation process is that governments don't allow, embrace and/or promote the new technologies. However, thanks to Demonetisation and Dematerialisation, neo entrepreneurs are increasingly finding ways to bypass the need for government support because they are now able to tackle big problems that were formerly the preserve of big money in the hands of government and Mega Corporations. Furthermore, social media has proven useful for prodding government into action. The Demonetisation and Democratisation of information and education is one example, but in future chapters you will see how this is happening in medicine and many other

spheres. Regardless, countries that adopt a progressive approach that embraces technology and encourages transformation should flourish, whereas those that resist it will almost certainly lag.

Mind-shifts
For us, the challenge now is to learn to let go of preconceived ideas, perceived limitations and bad habits and embrace the "new" unlimited capability mentality. Supposedly Einstein said, "We have to stop using old maps to explore new worlds". Part of this is letting go of society's old paradigm ideas like "I have to have a job, a car, a house" and embrace the new paradigm ideas which focus more on "I need to find work, can hail a ride and can live anywhere", and focus on our humanness. This newly coined concept is known as becoming exponentially human.

Our unlimited future capabilities
We are in an era where science fiction is becoming a reality. As Peter Diamandis says, "**For the first time in history our capabilities have begun to catch up with our ambitions**". Or, as I always say, "**If you can think it, you can do it**". Look how neo entrepreneurs have built empires that changed the lives of billions in a matter of years by throwing conventional thinking out of the window. However, as alluded before, some of these new tech entrepreneurs have overstepped their boundaries with respect to things like privacy invasion and/or exploitation. This sort of thing is inevitable in a transition period when society is grappling with a new paradigm and trying to formulate and establish a new set of rules for a new era.

Essentially, there is almost no problem that we cannot address and solve, even climate change, as you will see in subsequent chapters. We live in an era where anyone can change the world for the better, as the cost of starting up and growing a business has dropped dramatically. In fact, we live in a world, where we can reach billions instantly and technology has the power to change our lives for the better, but the onus is on us to use this power wisely. The millennials understand this and they are busy changing the world. Peter Diamandis said there are three forces reshaping our world "… the DIY innovator (who can do anything with less); the new breed or techno-philanthropists and the creative/market power of the rising billions", who will soon all be connected and enabled by exponential technology. NB! My parentheses.

Bottom line, in an era where anything is possible, we need to become believers of that statement "if you think it, you can do it". Therefore, we need to believe in ourselves and be bold. Pippi Longstocking's favourite statement was "I have never tried that before, so I think I should definitely be able to do that".

According to Mohammed Ali, anyone can change the world. He said:
"Impossible is just a big word thrown around by small men who find it easier to live in the world they have been given, than to explore the power they have to change it. Impossible is not a fact, it is an opinion. Impossible is not a declaration, it is a dare".

Aside: Organisations such as "X-Prize" are incentivising many to accelerate change, by offering huge prizes to anyone who can come up with scientific breakthroughs in situations where this is urgently needed, and progress has stagnated. They have had many "seemingly impossible" remarkable successes. Note! The winners' development costs often exceeded the prize money, but they reaped the rewards later when they commercialised their technology.

Technological progress – learning from nature
No matter how scary some of the concepts mentioned in this book may seem, it is important to remember that everything we do is governed by the laws of nature, of our creation. What is more important, is that science is gradually converging with nature, in that we are learning from nature

how to do things and then finding ways of replicating these. A perfect example of this is how modern DNA editing and Stem Cell technologies are merely using the power of nature, doing that which nature already does a gazillion times a day, to improve healthcare. Using these technologies, most diseases will soon become non-events and longevity a reality. Again, more about this later.

Technology future outcome scenarios
Technological change is going to happen whether we like it or not, so the big question is, "To what extent are we going to embrace it?". A poll of more than 100 futurists gave rise to these global scenarios (**My bold guesses for South Africa?**), as follows:

➢ Decline to disaster: Only reactive, tough life: Greed prevails, few have's and many have not's, descent into chaos. At Sovereign level, nominal co-operation, trade wars, conflict, no growth or negative growth (35% probability: **RSA 70%?**).
➢ Muddling along: Some countries and people get it right, some get it wrong – big gaps – Global growth slow, certainly less than population growth (60% probability: **RSA+ 30%?**).
➢ Wow world – Rise to Maturity – Responsible global order. Pro-active: Global "Selflessness", conscience, community first, education a priority, governments small and not controlling, focussed on facilitating/promoting innovation, nurturing creativity, ethics first. (5%).

However, if the South African government, or any other government, started putting the people first and embraced Futurism, the story could be very different. See the chapter on how countries compete.

Look at the bright side
Although the world is always full of Doom and Gloom scenarios, I am extremely bullish about the "long term" future for the following reasons:

➢ Humans have an amazing, almost infinite capacity to be innovative, adapt and solve problems, particularly during crises. Furthermore, we are likely to become increasingly "human".
➢ We are entering a new paradigm of unlimited capability and opportunity, arising from an unparalleled explosion of enabling technologies, new products and "new approaches".
➢ Ultimately, we are entering an era where "science fiction is becoming science fact" which is a reminder that "if you think it, you can do it".
➢ Eventually, Artificial Intelligence is going to be making many decisions for us, and these should on balance be better decisions, because they will be more fact based and human bias will increasingly have less influence. Is this a pipe dream? Probably not.

Sundry considerations
By the way, there are some who say that this is the "Fourth" industrial revolution; however, most experts insist that this multi-tech revolution is still part of the "Third" IT revolution. I am firmly in the "Third" camp, because it was ITs digitalisation, software and smaller, better, faster computers, that has facilitated most of the disruption discussed in this book. However, the breadth of new technologies and the exponential rate of change, certainly gives one a sense that this Multi-Tech revolution is different.

Aside from all the aforementioned disruptive technological revolutions, we are also in an Economic Paradigm shift. Jeremy Rifkin, world renowned speaker and prolific writer of books on technological change, suggests that there have been at least 7 major economic paradigm shifts in history. Each paradigm shift is driven by changes in the way we "manage", "power" and "move" economic life, namely:
1) New communication technology to more efficiently "manage" that economic activity/change.
2) New sources of energy to "power" that economic activity; and
3) New modes of mobility to "move" that economic activity.

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If you think about it, we currently have three massively disruptive technologies, one for each category listed above, creating a new economic "infrastructure" platform, namely:
1) The Internet, Digitalisation and Smartphones providing a new communication technology.
2) Solar and Wind providing a new source of power; and
3) Self Driven EVs and Drones providing new ways to move people and products.

Therefore, I conclude that we are left in no doubt that we face a major economic paradigm shift and that our world is changing both technologically and economically.

CONCLUSION: – Embracing change is not an option

Jean Monnet said, **"People only accept change when they are faced with necessity, and only recognise necessity when a crisis is upon them".**

Transition is always painful; therefore, we all need to become more pro-active rather than re-active about the future. Considering the magnitude of this technology Tsunami, we should act now and not dilly dally until crisis is upon us.

Technological change should not be feared. Although Futurism is disruptive in the short term, Digitalisation, Dematerialisation, Demonetisation and Democratisation should inevitably improve our lives as these will bring considerable cost savings, lifestyle benefits and convenience to most people on the planet. Digitalisation is going to allow us to make the above possible and everything about our future personalised.

Millions die because of lack of water, food, proper sanitation and adequate healthcare. Technology gives us the power to address all preventable diseases, most poverty curses and dramatically raise the average standard of living of every person on the planet. Let us make that our goal.

All the new technologies are going to make the world considerably more efficient, which never hurts the bottom line. In addition, automation is increasingly going to give us more free time, which we can spend being more productive or with our families, both of which typically help us increase our wealth. If that is true, the world is likely to be much better off in the future.

Whatever you do, do not forget that the "exponential" effect will bring the future into the present more quickly than you think, as adoption and efficiencies tend to at least double every two years and costs tend to at least halve every two years. Effectively this means that procrastination will be your biggest enemy in the future. Nor should you forget just how disruptive it will be to almost everything you hold dear, something I elaborate on in future chapters.

The winners of the future will be those who people, businesses and countries who choose to act quickly to embrace our rapidly changing world and adopt a new approach to life now, or by latest 2025. There will be a growing gap between those who are quick to embrace technology and those who are slow to do so.

It goes without saying that we all want a better future, but we need to embrace our rapidly changing world by broadening our understanding of the impact of impending change on our lives, in order that we may be able to identify alternatives and choose a better future. This sounds like a burden, but once you start on this journey, it is exhilarating and I wish you an adventure filled, thrilling journey. More importantly, when everyone is on the same journey, sharing insights and experiences, our common understanding of this space will snowball. The youth are already using social media to share such insights.

It is also important to remember that our pre-occupation with fads like social media are inevitably temporary and will give way to new fads. Therefore, we need to look beyond the temporary and focus on the fact that there is more to life than that. We need to focus on becoming better humans.

CHAPTER 2
JUST HOW DISRUPTIVE WILL TECHNOLOGY CHANGE BE -
The shocking truth

In the previous chapter, I touched on the extremely disruptive impact of countless new technologies on your children, family, life, business and society. However, it is critically important for you to understand **just how dramatic and far reaching these changes will be**. To illustrate this, I pick one example that you probably think you are familiar with but have, almost certainly, not thought through to its logical and surprising conclusion. So, let us explore the staggering disruptive impact of convergent technologies on the Automotive Industry, which accounts for about 3% of our global economy. Because this chapter deals with a lot of information, I have split it into manageable blocks. There are many, each more amazing than the one before, so it I important that you stay with me. I introduce you to and expand on a host of other disruptive technologies in later chapters.

Everybody has heard about emerging technologies like Electric Vehicles and Self-Driven cars, and about disruptive business models such as Uber, that provide Transport as a Service (TAAS). However, almost nobody realises just how disruptive these will be, so here goes.

Before we do so, let us look at some of the technologies that converged to make Self-Driven cars disruptive. These include the following: Satellite Communication, Geolocation, Robotics, Lidar (Light Detection and Ranging, a form of Radar), Super Computers, Image Recognition, Artificial Intelligence, Automation, Wi-Fi, Better/Cheaper Batteries and Cheap (Solar) Electricity.

Before I proceed, it is also useful to briefly summarise some of the above advances to set the scene for the many disruptive ripple effects elaborated on further down.
➢ The costs of both Battery storage and Solar Power are halving every 2 – 3 years. Obviously, ever cheaper, less bulky, more durable batteries will make Electric Vehicles (EVs) increasingly attractive as prices fall. Furthermore, Solar Power, which is now cheaper than conventional electricity and continually becoming cheaper, will increasingly be used to charge and power EVs.
➢ EVs have 50+ times fewer moving parts than Internal Combustion Engine (ICE) cars. Furthermore, their electric motors last 5X (5 times) longer and are at least "10X" cheaper to run than ICE cars. They are also greener in that they release no CO_2, which makes them attractive to environmentally conscious millennials. Another factor that makes EVs attractive is that they are far more energy efficient, because only 10% is lost as heat, whereas this figure is 80% for ICE cars. Therefore, in near future all ICE cars will eventually be replaced by EVs that last 5X longer for much the same price, with a running cost per km will is 10X lower.
➢ We have the TAAS "digital platform driven" business model disruption that comes into play. While a car that lasts 1.0 million miles (1.6m Km) may not be desirable for private owners, as these will last 60+ years, they are a winner for Car Rental and TAAS companies where they will only last 6 – 8 years because their cars do 100,000 to 150,000 miles per year. This is because the average utilisation of private cars is less than 4.5%, which makes them poorly utilised assets, whereas it is about 45% with TAAS. This will further drive down the cost of transport and makes TAAS an inevitable, logical choice.
➢ Before digitalisation coupled with supercomputers and deep learning, Self-Driven cars were always a possibility but never a reality. However, Self-Driven cars are now a reality that will make drivers obsolete, thereby further lowering the cost of TAAS in future. NB! Transport will soon become far cheaper!
In the next say 5 – 10 years these factors will make ownership of EVs instead of ICE cars, at the same price, a no brainer. But by latest 2030 TAAS will be far cheaper than private ownership, which will almost certainly make individual car ownership obsolete. Accordingly, it becomes clear that most cars will, in future, be fleet owned by manufacturers, car rental and TAAS companies. NB! Some

major cities like London have already legislated that ICE cars will be banned from 2030, due to pollution considerations.

Just for perspective on this date, let us apply our exponential formula from chapter 1 to the growth in the adoption of Self-Driven EVs. If the number of electric cars on the road were to double every 2 years, all the cars on the road would be electric within 13 years, or by 2033, as follows: year 2 (2018 – 2020 = 2x more cars), year 4 (4x), year 6 (8x), year 8 (16x), year 10 (32x), year 12 (64x). Volvo has already stated they will only make EVs from 2025. This adoption may lag by up to 10 years in poorer countries, because the poor will not be able to afford to relinquish their old ICE cars.

Below, I highlight many stages of disruption in the transport industry, each more disruptive than the one before. Cumulatively, it is virtually beyond comprehension.

<u>The impact of Self-Driven TAAS EV cars on our lives</u>
So, while you may think that the above is disruptive, it is only the tip of the iceberg. Let us explore the unimaginably wide-ranging impact of the above statements on our lives, over the next 10 – 15 years, starting with a few obvious ones. Those of us who have used TAAS will know that Self-Driven TAAS cars can and will make us more productive as we will be able to work and even have meetings in transit, because these will all have great Wi-Fi. Furthermore, they will eliminate the stress of traffic and be far safer as they eliminate human "distraction" errors, so we no longer need to live close to work. This will allow us to choose a more rural lifestyle, which could affect property prices, with in-city prices going down and rural prices going up. Furthermore, Self-Driven TAAS will eliminate the "high" cost of car ownership and drive down the cost of transport, which will leave us with more disposable income. To illustrate, let us amortise a USD $ 36 000 ICE car over 10 years and we have a capital cost of over $300/mth. Now add insurance, service costs, tyres, spares, fuel, etc. and we are quickly over USD $600/mth. In fact, the average cost of owning a car in the USA is $10 000 per annum, or $800+/mth. It is unlikely that we would ever spend half that much on TAAS, rail, or bus, especially as these prices will decline considerably in the next 10 years, because the cost of TAAS will also put downward pressure on all other forms of public transport. Double this for your spouse's car and you could save a fortune. Eventually we may use these savings to rent a Self-Driven car for long holiday trips. This financial windfall is not as clear-cut for poorer people who drive wrecks.

<u>The impact of Self-Driven TAAS cars on vehicle manufacturers and car populations</u>
Now for a real shocker. Although the amount of global passenger miles is likely to continue to increase in the next decade or two, as the standard of living of people around the world improves, the number of cars on the road will virtually collapse for the following reasons:
➢ The number of cars being manufactured is likely to fall by about 80%. Think about it, if Electric Vehicles last 5X longer, we can manufacture 4/5^{ths} = 80% fewer cars per annum. This in itself does not change the number of cars on the road. But,
➢ As private ownership falls away and we improve vehicle utilisation from 4.5% to 45% with TAAS, we only need 1/10th of the number of cars on the road, which means the number of cars manufactured could fall by more than 80%. However, due to considerations such as the number of cars required to cope with rush hour commuters, this is only likely to fall by say 70%. This could be more like 80% if ride sharing becomes a norm; and, furthermore,
➢ As private owners with their infinite preferences decline and TAAS companies become the dominant owner of cars, the latter do not need the current variety of car models or extras as they will be more interested in utility and passenger experience, than looks and performance. Therefore, we will probably end up with say 4 – 5 "basic" models per manufacturer, such as 1x economy, 1x midsize, 1x upmarket and 1x luxury, which would allow serious mass production and bring costs down further. Now,

- If we add to this the fact that people are increasingly working from home and scholars may increasingly study online, we certainly will be manufacturing at least 80% less cars, or at most 20% of the current number of cars by 2035. However,
- By 2035, Pilotless Passenger Drones aka Pilotless Air Taxis, will almost certainly be competing head on with cars, which would further reduce the need for cars. More about that later.

Now we should take note of the fact that there are many new companies producing EVs today, that were never producing ICE cars in the past, such as Tesla and China's BYD. This means that we will have almost twice as many car manufacturers chasing a market that will have shrunk by 80%. This raises the question – "which companies are going to win the race for market dominance and which companies are going to fall by the wayside?" Remember, we are talking about many massive companies, some of which support huge communities and towns, that will fail or shrink in the next decade, or two. How do investors choose which companies will survive?

The impact of Self-Driven TAAS cars on ancillary support industries and even countries
Again, this is not the end of the disruption story. One consequence of all the above, is that many other markets and industry sectors will be severely impacted. I mention some of the more obvious ones here:

- The demand for steel used in the automotive sector will fall by 80% due to reduced volumes, engines, parts and other components. Since the automotive industry uses about 25% of global steel, an 80% reduction in automotive demand could translate into a 20% reduction in the global demand for steel. However, if Self-Driven cars are safer and far less prone to accidents, even less steel may be needed. Furthermore, if EVs last longer, we should make them from materials that do not rust. The fact that newer and stronger materials are being developed suggests we could see even greater reductions in the amount of steel used.
- The global demand for oil is likely to decline by at least 30%, probably closer to 50+%, as about 70% of oil is used to produce fuel and lubricants for ICE vehicles, whereas EVs only very occasionally need lubricants. This will have a dramatic impact on the demand for oil, which means the price of oil could more than halve by 2030/35. We saw a trial run of this when the Coronavirus lockdown, caused fuel demand and oil prices to collapse. This would wipe out the more expensive oil producers, refineries, pipelines and transport companies, which will negatively impact the revenue and GDP of many companies and oil producing countries around the world.
- The demise of ICE cars and private ownership means that all the new and second-hand car dealers, tyre shops, wheel rim dealers, service centres and spares shops will fall away as TAAS companies will have their own recharging stations and workshops. In fact, at some point during the transition from private to fleet ownership, we could have difficulty getting rid of our ICE cars because nobody wants them, and we may have to pay someone to take our car and scrap it.
- EVs will be electrically or "Solar" charged at work or at home and do not need regular servicing or gasoline, so most of the corner mechanics and filling stations will fall away. In fact, they are currently perfecting thin-film photovoltaic technology, where the paint coat on your car becomes a solar collector that can charge your car while it is parked or on the road.
- As mentioned, one also has to ask oneself to what extent future reductions in the cost of transport using TAAS and/or Drones will put downward pressure on other transport sectors like trains, busses and even airplanes. In this mass transport category, Self-Driven electric busses and Hyperloops are emerging as alternatives. Hyperloops move magnetically or pneumatically levitated passenger capsules or pods in vacuum tubes at extremely high speeds. The first one is currently being built in Abu Dhabi. Hyperloops offer numerous advantages over air travel. They are faster than air travel, can go from convenient inner-city locations rather than remote airports, and require little energy, which can be supplied by green renewable sources.

<u>The disruption and consequent unemployment of Self-Driven TAAS cars on direct support industries</u>
Next, we look at factors that will contribute to a considerable increase in future unemployment in the automotive industry, with the advent of TAAS and Self-Driven cars, which suggests that we will have to reskill millions of people for other jobs/work. These include the following:
➢ Cars will be Driven by computers, so we will no longer need delivery, taxi, truck or bus drivers. However, that is only the tip of the iceberg, as
➢ Self-Driven cars' computers are not going to break the law by speeding or parking illegally, so we no longer need traffic police or meter maids. NB! Governments will earn less revenue from fines, petrol levies and parking.
➢ Cars driven by computers will eventually have almost zero accidents, so by 2035 we will no longer need panel beaters, short term vehicle insurance, paramedics, trauma staff and the like to deal with accidents.
➢ Self-Driven cars do not need bumpers, steering wheels, pedals, gear shifts, dashboard displays, rear view mirrors, indicators, rear brake lights and many more parts, which means all the people making these will be unemployed. Nor do we need the km's of wiring that connect all the above.
➢ The demise of ICE cars also means that we no longer need all the engine parts for ICE engines. Nor do we need starter motors or gearboxes – yes, EVs do not need gearboxes, as DC motors produce fairly constant torque/power at all revs; and finally,
➢ We will need 80% less people making the rest of the parts that are still required for EVs, like chassis, axles and steering linkages.
If accident rates diminish sufficiently, safety becomes a lesser concern and we could redesign the cars by replacing steel body panels with greener recycled materials and features like air bags could be eliminated.

<u>The disruption of Self-Driven TAAS cars on traffic, roads and parking lots</u>
Now for a look at the impact of Self-Driven TAAS cars on roads and parking lots. Self-Driven TAAS cars linked to a central computer will be able to drive on highways with say 10 – 15 metre gaps, as all the cars will slow and accelerate simultaneously, which means we can fit more cars on the roads and will need fewer streets. In addition, if we have, say 80% fewer cars on the road we will need even less streets. This means some streets can have wider pavements, become pedestrian avenues, or even parks. Cars that are driven by computers with navigation, do not need street signs as they use geolocation; traffic lights, as they may cross alternately like Lipizzaner's; and only enough streetlights for pedestrians. We will have no congestion delays or gridlock as Self-Driven cars will not stop in intersections and central computers can quickly reroute traffic in an orderly manner. Furthermore, since TAAS cars are either on the go, temporarily parked or at their fleet parking lots, there will be no need for parking garages/lots at offices, shopping malls and elsewhere. What to do with these? TAAS will also free up our garages at home, which could be converted to rooms that can be rented out. Remember, all this will play out over the next decade.

<u>The business model disruption facing car manufacturers – including Drones</u>
Bottom line, there will still be car manufacturing companies in the world, only less, and they have to change their business model, from one where they sell less, to one where they own more cars. Most major car manufacturers are already setting up their own TAAS companies that position Self-Driven EVs all over cities for us to use on a "Grab & Go" basis. Consequently, they will manufacture cars that a subsidiary will own and run in competition with car rental companies like Uber. For example, BMW and Mercedes have set up a TAAS joint venture. Remember, in the near future all TAAS cars will be Self-Driven EVs. In 2018, you could already take a Self-Driven taxi in Singapore, Dubai and some cities in the USA. Tesla already has a car that can travel from the US East coast to the West coast with no driver and plans to introduce a level 5 Self-Driven car that has no pedals or steering by 2020. Imagine that from 2030, many of these cars are likely to be replaced by "self-piloted" passenger Drones. Dubai started testing pilotless passenger drones to ferry people from the Airport to their hotels in 2019. The software for controlling countless drones in a small space already exists

as demonstrated at the Beijing Olympics, where 1218 "lit" drones interleaved in 3D space to display different moving images. The primary thing standing in the way of the prolific use of passenger drones is amendments to aviation regulations to allow and control the airspace in cities and between buildings. Below is an image of a passenger drone. These come in many shapes and sizes and there are many more currently being tested. I expand on drones as air taxis in a later chapter. All this suggests that car manufacturers, who are in the mobility business, should be adding scooters and drones to the list of products they produce and sell.

There are, however, things that might retard the rapid adoption of EVs and Self-Driven cars, such as the availability of charging stations (temporary opportunity?), clearance of regulatory impediments and provision of a new regulatory framework. The pace of consumer adoption could also hold back progress, which could be said for most emerging technologies. Similarly, disruption may lag in poorer developing countries like those in Africa. However, the magnitude of the effective savings will motivate governments, municipalities, organisations, lawmakers and people to address these with considerable urgency. Tony Seba defines the tipping point as 10X. This is because every time we see a ten-fold reduction in costs, or improvement in efficiency in any industry, the savings and/or benefits are so economically irresistible that it galvanises people into action. This is certainly happening in the motor vehicle industry, which means EVs and Self Driven EVs will quickly get the necessary support.

Obviously, many companies are initially still likely to own their own self-driven delivery vehicles, due to the distances they cover, but drone deliveries or hyperloops could change this between now and 2040.

Other considerations
Some questions cannot be answered today, such as what 4x4 users will do in the future, as renting a Self-Driven 4x4 would take most of the fun out of going on a bush-whacking Safari. There are already a series of flying "Drone Motorcycles" being tested around the world, which can obviously go on roads, off roads or on water. Radical stuff? I suspect driving "old" cars will become a hobby on dedicated circuits, much like performance cars today.

Eventually, the entire transportation system is going to be loaded with sensors and is going to become one integrated system with comprehensive communications and tracking systems providing continuous feedback. Vehicles, roads, railways, airplanes, drones and ships will eventually all be integrated with smart AI systems to facilitate logistical planning and optimisation of mobility.

People say that Self-Driven cars have caused accidents, but this is still an immature industry that is rapidly solving any problems with the aid of emerging technologies. Therefore, these will become increasingly reliable and safe. This is not something we should resist, because automated cars do not suffer from driver irregularity arising from inappropriate reactions in times of uncertainty or crisis, falling asleep at the wheel, drunken driving and the need for speed. With Self-Driven cars we will be free to do the things we do now, like talking on our phones, reading notes, texting, or doing our makeup, without increasing the risk to ourselves, our families and people at large.

From all the above it is clear that Self-Driven EVs will have a dramatic impact on our lives, lifestyles, unemployment, stock markets and the economy. The world will also be a quieter place with no honking or exhaust noise, as EVs are almost dead quiet.

Ray Kurzweil, one of the most successful futurists predicts that:
Virtual Reality (VR) will advance so much that physical workplaces will become a thing of the past. i.e. We will increasingly become immersed in a virtual world. Within a few decades, many of our commutes could just become a matter of strapping on a headset. Others have suggested that VR will radically disrupt the Leisure and Travel industry, and consequently the Airline industry, as we escape into a virtual world with the aid of a headset. Who would have thought that VR trips to far-away places could be a competitive threat to the airline industries and travel destinations?

Remember, the above only covers disruption to our lives in the automotive industry. However, currently there are at least another 30 such disruptive events on the horizon, each of which is still in its infancy. Each will disrupt some or many industries, economic models, numerous economic sectors, whole countries and the employment arena. Furthermore, each of these can and will give rise to numerous other, hitherto unforeseen disruptions. In subsequent chapters I will discuss numerous other disruptive technologies, including 3D printing, Robotics, Solar Electricity, Artificial Intelligence, Education, Healthcare, Virtual and Augmented Reality, albeit not in such depth. It is important that you join me in this journey of understanding just how disruptive each is, since these are going to change our lives and world enough to rock you and yours. Embracing this helps you anticipate change and identify opportunities.

CONCLUSION: – You will have way more disposable income if you never buy another car
The cost of TAAS will continue to fall for the next 10 years because EVs are becoming cheaper to produce, last 5x longer, are cheaper to run and will in future require no driver. The modern youth already mostly prefer TAAS to ownership, as they have adopted a new behavioural trend whereby, they prefer to pay to use rather than to own. With immediate effect, people should think long and hard about buying another ICE vehicle as EVs are already a more prudent proposition, if only because they last longer and are cheaper to run. However, the real question is whether they should buy a vehicle at all, especially with the advent of Self-Driven TAAS EVs. Instead every couple should only have at most one car for longer trips and use TAAS for shorter trips. The savings you will achieve will easily cover the cost of TAAS and the occasional Self-Driven car rental for holiday trips, leaving you with more disposable income. Many people and couples could and should avoid buying or owning a car with immediate effect, since owning such a poorly utilised asset will increasingly no longer make any financial sense in this modern world.

Coming to grips with just how disruptive each technology can be is vital, as illustrated above.

For further perspective and convincing charts, it would be useful if you would watch a 1-hour video – Google "Tony Seba Clean Disruption". It is very insightful, convincing and entertaining, and the post mortem is half the fun, so watch it with your spouse, family, or friends.

CHAPTER 3
RISING UNEMPLOYMENT? There will be LESS JOBS but FAR MORE WORK

Before we continue, just a very brief chapter on unemployment. There is a lot of talk about unemployment, especially with recent advances in automation, robotics and artificial intelligence, which will progressively replace all predictable, logical, boring and repetitive jobs. This is a real risk in countries that are slow to, or do not embrace emerging technologies, which may well include those in Africa. More specifically, those that stick with "the old" and do not embrace the new technologies, each of which creates new jobs, will see job losses. However, in a global future world context I believe anticipated job losses are extremely misleading and almost certainly exaggerated in the long term. I explain below why I believe there will be more work than ever. However, there will certainly be considerable disruption in all employment markets in the next decade as we transition from an industrial era economy to a multi-tech era economy.

Many people worry about job losses due to automation and robotics. However, with every new technological revolution since the agricultural revolution, the variety and availability of jobs has increased as the diversity of industries expanded. The agricultural revolution provided much hard manual work with limited career opportunities, communication, mobility, mechanisation and energy sources. The second great industrial revolution provided hugely expanded/improved progress and opportunities on each score. The third industrial/IT revolution provided an even greater variety of even better opportunities. The current third/fourth Multi-tech revolution promises to be far better on every count, particularly in respect of the diversity of jobs, many of which have not been invented. However, at this point I do think we need to differentiate between "jobs" and "work", which requires a mind shift. Essentially, there may be less "formal" jobs, but there is going to be more work than ever. This is partly because companies are increasingly contracting work out, rather than employing.

Every revolution has created more jobs, as evidenced by the aforementioned progression, but this becomes even more apparent if you take into account a few additional considerations, including the following:

➢ One hundred years ago, it was the men doing all the "jobs" work and the wives worked at home. However, with modern appliances and finishes that reduce work in the home, many women are now working too, and so the number of people in the workforce probably grew by 50%, over and above population growth. Regrettably, this drove down "real" wages. Furthermore,

➢ As recently as 100 years ago, people used to die early, now they work until they are 65, 70, 75 and even older. I know a numerous people who are still working in their mid-80's. If people work longer, it means their jobs are not being freed up for the youth. This probably reflects another 50% increase in the actual number of people in the workforce, for a combined doubling. Regrettably, this too drove down "real" wages. Fortunately, technology made many products and services more affordable, so that hardship was partly mitigated.

➢ Above I alluded that automation tends to create jobs, so we need to embrace, not fear automation:

  o A perfect example of this was the Silk/Nylon stocking industry. Silk stockings were expensive and only the rich could afford these. Then, in the 1930s, DuPont came up with Nylon and subsequently machines were made that could produce nylon stockings. The Silk-stocking workers protested because they were going to lose their jobs, but because Nylon stockings were suddenly much cheaper than Silk stockings, most women could suddenly afford these. Subsequently, the stocking industry was suddenly employing at least 10x more people.

  o Let us also reflect on a more recent example. When IT reared its head, everyone said we were headed for a paperless society and secretaries would no longer be needed. However, we still use paper and we still have secretaries, but in addition we created huge industries making

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computer chips, making computers, distributing and selling computers, repairing computers, designing software, designing games and the like. Furthermore, secretaries' jobs became far more interesting and they became more productive, as they were able to produce better more useful reports.

The important message here is that technology brings down costs, which increases demand, which expands the industry, which creates work. Furthermore, where jobs are not replaced by technology, technology tends to augment, not replace us in that we end up being able to do our jobs better and more efficiently. Technology also tends to improve our productivity and, in so doing, gives us more time to do more and/or other things. Furthermore, each new technology breeds unimagined ancillary uses and businesses, which create whole new industries. Just think how many industries have been created around the computing power of, and software platforms for, the humble Smartphone.

Essentially, if you look back, you will also notice that careers have continually progressed from manual to intellectual and this is likely to continue. Bearing in mind that not everybody is equipped for intellectual jobs, this makes a broader, more holistic education even more important. However, another important category in future employment will be jobs requiring hyper human skills like kindness and compassion, as discussed in a later chapter on education.   These are important concepts to hold in mind in the next chapters, as we move away from formal jobs to diverse careers and novel ways of earning an income.

We all know that Automation, Robotics and AI are going to take away many jobs in our materialistic world of physical products. However, they are going to create even more jobs/work in the digital arena.   Furthermore, while computers can do things for us, they cannot live our lives for us. Therefore, our future will increasingly be about jobs arising from us "living our lives". For example, we have created many new "employment" worlds in the past decades and continue to do so. Think of the total employment in the entire professional sport industry, which never existed less than a century ago. Think of the new sports we have invented, as illustrated by the growing number at the Olympics. Because humans are quickly bored and resourceful, they keep coming up with new things to do and, if others like it, they suddenly make a business of it by selling the idea to others. Motorcycles were for mobility, until they were embraced in a variety of sports. Think of how hobbies like Monster Trucks have grown into a huge "entertainment" industry. Each of these entertainment industries requires support staff and creates growth in knock on support industries such as increased demand for TV coverage, grandstands and many more. A more futuristic example is the number of people currently employed in the rapidly growing world of Virtual and Augmented Reality, which is expected to account for 20% of GDP by 2030. I elaborate on this in future chapters.

Other considerations include self-employment, which is increasingly viable thanks to the "ease of starting up a company" which has dropped to less than $5 000, the "ease of marketing to billions" and "ease of doing business" via the internet. It seems true that youth unemployment is high, but this may be due either to incorrect assumptions because many of the youth are flying/working under the radar, or to apathy that is encouraged by the dole system of entitlements. Many of the youth are now far more entrepreneurial than people were in the past, or, maybe more correctly, in the past the costs and logistics of setting up a business kept people out of the entrepreneurial space. Regardless, the youth are thinking up new careers and creating hitherto unimagined new businesses, many of which are online and earn them money while they are "supposedly" unemployed. They are even earning money playing games online. This may currently be in evidence in the USA, where "total" unemployment was high in 2018, but companies could not find people to fill positions, presumably because they were otherwise occupied? Certainly, longevity could create huge industries in both entertainment and the care of the aged. In future, intellectual pursuits higher up Maslow's hierarchy, like those that are philosophical or spiritual may create growing industries.

Despite all the above, countries, regions and cities play a crucial role in managing unemployment in their domains. Essentially, those countries, regions and cities that are supporting dying industries and not encouraging futuristic industries will gradually regress. I dedicate a later chapter to countries' competitiveness.   All cities and regions must continually review whether or not their primary industries are at risk, decide what "future" business they want and "attract" the right sort of industries. For example, Detroit could lose most of its vehicle manufacturing plants and should, therefore, review its competitive advantages and figure out what future industries it wants to attract by way of incentives, such as Drone production, failing which it could face unacceptable unemployment. That, in turn, leads to reductions in local tax revenues and puts pension funds at risk.   Some cities are already setting up free Wi-Fi infrastructure and trying to encourage IT developers. Others are trying to become innovation hubs like Silicon Valley, or hubs for rapidly expanding industries like healthcare.

Government regulation can also play a huge part in unemployment. The more governments encouraging business to embrace technology and make the business environment tax, investment, labour and entrepreneur friendly, the more likely it is that business is going to flourish. There is a myth that government can create jobs, but governments produce nothing, which means they add little or nothing to GDP growth, and the taxpayers are merely employing other taxpayers. The only real employment growth comes from the private sector, which has an incentive to invest capital to produce for profit, to improve efficiencies and exploit new opportunities, so that is the sector that government must enable.

CONCLUSION:

It is my contention, that we will see rising unemployment during this transition from an industrial to a future technology economy, which will compel people to "reset" their skills, but that it will not be a huge issue in the long term. That is because there will be plenty of work. However, many experts are predicting that we will gradually be compelled to consider a guaranteed Universal Basic Income (UBI), which suggests higher taxes – especially on the rich. I am against a UBI as it rewards slackers, removes the incentive to be creative and find work, and is degrading.

I do believe there will be a gradual shift away from conventional "full time" jobs in a single discipline and/or with a single company, to more fluid income producing activities over multiple disciplines and/or from multiple sources at the same time. More specifically, people could increasingly be working for more than one company at once across multiple disciplines, frequently from their homes. At the same time, they could and probably would be engaged in earning income from own endeavours or passive sources.

It is also important to realise that most future jobs will require considerable digital skills, familiarity with a diversity of internet communication platforms and the ability to work online. This is partly because all administrative systems will be digital. This will, inter alia, create increasing opportunities for people with disabilities.

NOTE!
A few of the chapters that follow are short, but necessary bridging chapters, that provide technological perspective and context for subsequent chapters that are more interesting or pertinent to our everyday lives, such as healthcare and education.