

FutureScapes

# TECHNOLOGY VS. HUMANITY



The coming clash between  
man and machine

**Gerd Leonhard**

# Praise for *Technology vs. Humanity*

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"Gerd Leonhard is most definitely a member of Team Human. Here's his convincing and heartfelt call for the reinstatement of people and purpose into the technology program."

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"Our world is transforming at breakneck pace. Gerd is raising the central most important question of the century: what will our ethics be? His book can help us choose the path of a beautiful and rich future and avoid the path where that future – by virtue of billions of unconscious non-decisions – has impoverished our lives beyond repair."

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"Gerd Leonhard provides a fascinating look at the impact of exponential technologies and the dilemmas we will face in adapting to—or being adapted by—these. His book really makes you worry—and think."

**Videk Wadhwa**, Academic, researcher, writer, and entrepreneur

"Gerd Leonhard zeroes in on some of the most vexing worries about our coming age of mechanically-enhanced thought. Are there "win-win" ways to gain the advantages without sacrificing our humanity? Can we bio-minds teach the newer kind ethics? Or love?"

**David Brin**, Author of *Earth* and *Existence*

TECHNOLOGY vs. HUMANITY

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# Table of Contents

INTRODUCTION.....	i
CHAPTER 1: A Prologue to the Future .....	1
CHAPTER 2: Tech vs. Us.....	16
CHAPTER 3: The Megashifts.....	32
CHAPTER 4: Automating Society.....	47
CHAPTER 5: The Internet of Inhuman Things.....	65
CHAPTER 6: Magic to Manic to Toxic.....	70
CHAPTER 7: Digital Obesity: Our Latest Pandemic.....	97
CHAPTER 8: Precaution vs. Proaction .....	106
CHAPTER 9: Taking the Happenstance out of Happiness .....	111
CHAPTER 10: Digital Ethics.....	133
CHAPTER 11: Earth 2030: Heaven or Hell? .....	148
CHAPTER 12: Decision Time .....	158
ACKNOWLEDGEMENTS.....	168
RESOURCES .....	170
FAST FUTURE PUBLISHING.....	171

# Introduction

*How can humanness prevail in the face of exponential and all-encompassing technological change?*

Our world is entering a period of truly transformative change where many of us will be surprised by the scale and pace of developments we simply hadn't anticipated. These exponential technological advances offer tremendous potential, and with these opportunities come tremendous new responsibilities.

## **Humanity's biggest challenge**

I believe the scale of change caused by recent, unforeseen events such as Brexit (the UK's June 2016 referendum decision to leave the European Union) will be miniscule compared to the impact of an avalanche of technological change that could reshape the very essence of humanity and every aspect of life on our planet.

In the past, each radical shift in human society has been driven primarily by one key enabling shift factor—from wood, stone, bronze, and iron, to steam, electricity, factory automation, and the Internet. Today, however, I see a set of science and technology enabled Megashifts coming together that will redraw not only commerce, culture, and society, but also our biology and our ethics.

## **A manifesto for furthering human flourishing**

Let me be clear: Technology vs. Humanity is neither a celebration of the rapidly onrushing technology revolution nor a lament on the fall of civilization. If, like me, you're a film buff, then you've probably

already had more than enough of Hollywood's utopian visions and dystopian warnings. The future cannot be created based on blind optimism or paralyzing fear!

My goal with this book is to amplify and accelerate the debate about how to ensure that we guide, harness, and control science and technology developments so that they fulfill their primary purpose, which should be serving humanity and furthering human flourishing.

My ambition is to take the discussion beyond the realms of the exuberant technologists, serious academics, and thoughtful analysts to express a set of concerns that are nowhere near to being addressed or even recognized by the population at large. As a futurist—and increasingly more of a nowist—I am also hoping to give real presence and current urgency to a future that seems beyond comprehension and unworthy of attention for many.

As such, this book is deliberately designed to be a passionate discussion starter for what I consider to be the world's most important conversation. I believe my role here is to open up and catalyze the debate; hence, I have set out to craft a spirited manifesto rather than a blueprint or “how to” guidebook. To help stimulate and further that debate, I will expand on the themes outlined in the book through my future talks, online contributions, and films.

### **Just because we can, it doesn't mean we should**

I believe we need to step back from an expert-led debate about what's possible and how to achieve it. Instead, I think we must start with a more fundamental exploration of what role we want these transformative technologies to play in serving humanity: Just because we can, it doesn't mean we should.

To help guide this exploration, I have set out what I believe to be the driving forces of change, and presented an assessment of their potential impacts and implications. I have highlighted many fundamental questions raised by the accelerated—and in many cases exponential—pace of development across multiple fields of science and technology.

I argue that we must place human happiness and well-being at

the heart of the decision making and governance processes that will shape future investments in scientific and technological research, development, and commercialization because, in the end, technology is not what we seek, but how we seek.

I go on to present a range of different scenarios on how things might play out depending on the development path we take to the future. I conclude with a starter set of straw man ideas to kick-start discussions on how to choose the best path for humanity, and how to make good decisions along the way.

To open up this ambitious conversation and help guide the discussion, I have structured my thoughts into twelve key chapters:

**Chapter 1: A Prologue to the Future** – Halfway through the century’s second decade we are at a critical pivot point in technology evolution, a hinge moment when change will not only become combinatory and exponential but inevitable and irreversible. Here I argue that now is our last chance to question the nature of these coming challenges, from artificial intelligence to human genome editing. Striking a balance will be the key.

**Chapter 2: Tech vs. Us** – In this chapter, I explain why technology may increasingly simulate and replace—but can never become or be us. Technology has no ethics, and therefore its imminent entry into our most private lives and biological processes must be negotiated as a top civic and corporate priority. I examine the nature of ethics as a human signifier and differentiator, transcending differences of religion and culture.

**Chapter 3: The Megashifts** – Digital transformation is being touted as the paradigm shift *du jour* across enterprises and the public sector—when in fact it is just one of ten Megashifts that will interact and alter the face of human life forever. I explore these Megashifts—from mobilization and automation to robotization. These are not slow evolutionary processes which we will have time to integrate and adapt to. Rather, they will trigger a tsunami of disruption and

change, potentially equating to a mass extinction event for much of the existing global commerce infrastructure.

**Chapter 4: Automating Society** – This chapter challenges the pervasive and seriously misleading myth that automation will only disrupt blue-collar—or even white-collar—labor. The coming wave of automation will move way beyond the factory or public infrastructure and into our very biological processes such as aging and even giving birth. Used as we are to the gradual societal shifts brought about by previous change waves, often allowing decades to adjust and respond, I ask if we as a tribe are ready to abdicate our human sovereignty to the faceless forces of technology? Are you ready for the biggest loss of free will and individual human control in history?

**Chapter 5: The Internet of Inhuman Things** – This chapter explores the potential challenges posed by the Internet of Things—the current dominant narrative within digital transformation, with thousands of corporate strategies riding on its tailwinds. Have we paused to ask ourselves the difference between algorithms and what makes us essentially human—what I call the androrithms? Will the Internet of Inhuman Things gradually and then suddenly require us to forgo our humanity and become ever more mechanistic just to remain relevant? As computing becomes mobile, then wearable, and soon ingestible or implantable, will our distinct planetary advantage as a species be sacrificed for a spurious digital hit?

**Chapter 6: Magic to Manic to Toxic** – Here I examine how our love affair with tech often follows a predictable curve from magic to manic to—ultimately—toxic. As we allow ourselves to experience life as an ever more mediated and processed sequence of encounters, we may think we are enjoying ourselves, but in reality we are simply being hot-wired by our hormones—hormones increasingly targeted by the gentle purveyors of “big tech.” As we rave through the all-night honeymoon party that is technological progress, it’s salutary to think about the hangover—the price to be paid tomorrow, and forever.



**Chapter 7: Digital Obesity: Our Latest Pandemic** – This chapter discusses how digital obesity may not be as currently familiar as the physical kind, but is rapidly developing into a pandemic of unprecedented proportions. As we wallow and pig out on a glut of news, updates, and algorithmically engineered information, we also entertain ourselves in a burgeoning tech-bubble of questionable entertainment. Taking into account the coming tidal wave of new technologies and digital engagement platforms, it's high time to think about digital nutrition just as we already do about bodily nurture.

**Chapter 8: Precaution vs. Proaction** – This chapter sets out the argument that the safest—and still most promising—future is one where we do not postpone innovation, but neither do we dismiss the exponential risks it now involves and hand it off as “somebody else’s problem.” The bill passed on to the next generation for today’s new technology gambles cannot be postponed—any downside will be immediate and unprecedented in scale. I argue that precaution and proaction, the two principles often deployed to date, are both insufficient to deal with a combinatorial, exponential scenario where waiting will be as dangerous as firing ahead. Transhumanism—with its lemming-like rush to the edge of the unknown—represents the scariest of all present options.

**Chapter 9: Taking the Happenstance out of Happiness** – Money talks, but happiness remains the bigger story. Happiness is not only considered the ultimate goal of human existence across philosophies and cultures, it also remains an elusive factor resistant to exact measurement or technological replication. As big tech simulates the quick hits of hedonistic pleasure, how can we protect the deeper forms of happiness that involve empathy, compassion, and consciousness? Happiness is also related to luck, to happenstance—but how will we use technology to limit the risks of human life and still preserve its mystery and spontaneity?

**Chapter 10: Digital Ethics** – In this chapter, I argue that, as technology permeates every aspect of human life and activity, digital ethics will evolve into a burning, un-ignorable issue for every individual and organization. At present we do not even have a common global language to discuss the issue, let alone agreement on accepted rights and responsibilities. Environmental sustainability is often brushed aside by the developing economies as a first world problem and is always sidetracked during economic recessions. In contrast, digital ethics will force its way to a permanent position at the front and center of our political and economic lives. It's time to have the ethical conversation about digital technology—a potentially greater threat to continued human flourishing than nuclear proliferation.

**Chapter 11: Earth 2030: Heaven or Hell?** – As we move imaginatively into the near and medium future, we can easily visualize some of the gigantic changes altering work and life out of all recognition—these are explored here. Many of these seismic changes are to be welcomed per se—like working for a passion rather than for a living. However, many of the most basic privileges we once took for granted, like freedom of choice in consumption and independent free will in lifestyle, could become vestigial echoes or the preserves of ultra high-net-worth individuals. Heaven or hell? Make your choice, but do it now.

**Chapter 12: Decision Time** – In this closing chapter I argue that it's crunch time for tech adoption—not the application of technology itself, but the deeper integration and delineation of technology in human life. Numerous ethical, economic, social, and biological issues will simply not wait for another forum or the next generation. It's time to regulate mass technology application just as we would any other transformational force such as nuclear power. This is not the conclusion of a rich dialogue, but the beginning of a conversation that needs to become mainstream in our media, our schools, our government, and—most immediately—our boardrooms. The time for technologists and technocrats to simply hand the ethical buck over to someone else has passed.

I hope that this book inspires you to think deeply about the challenges we face, and I invite you to contribute to this conversation by becoming a member of the techvshuman/TVH community at [www.techvshuman.com](http://www.techvshuman.com).

*Gerd Leonhard*  
*Zurich, Switzerland*  
*August 2016*

# Chapter 1

## A Prologue to the Future

*Humanity will change more in the next 20 years than in the previous 300 years.*

Human beings have a habit of extrapolating the future from the present, or even the past. The assumption is that whatever worked well for us up to now should, in some slightly improved shape or form, also serve us nicely in the future. Yet the new reality is that, because of the increased impact of exponential and combinatorial technological changes, the future is actually very unlikely to be an extension of the present. Rather, it is certain to be utterly different—because the assumption framework and the underlying logic have changed.

Therefore, in my work as a futurist I try to intuit, imagine, and immerse myself in the near future (five to eight years out), present views from that world, and then work my way back to the present from there rather than towards it.

Starting with a report from that near future, this book goes on to explore the challenges and lay out a manifesto, a passionate call to stop and think before we all get swept up in the magic vortex of technology, and eventually become fundamentally less rather than more human. This is a good time to remember that the future does not just happen to us—it is created by us, every day, and we will be held responsible for the decisions we make at this very moment.

## **A historic inflection point**

I feel that we are living in one of the most exciting times in the history of mankind, and I am generally very optimistic about the future. However, we definitely need to define and practice a more holistic approach to technology governance in order to safeguard the very essence of what being human means.

We are at the inflection point of an exponential curve in many fields of science and technology (S&T), a point where the doubling from each measurement period to the next is becoming vastly more significant.

At the heart of the story of exponential change lies Moore's Law—a concept which originated in the 1970s, and which, simply put, suggests that the processing speed (i.e. the amount of computer processing power on a chip) that we can buy for US\$1,000 doubles roughly every 18–24 months.<sup>1</sup>

This exponential pace of development is now evident in fields as diverse as deep learning, genetics, material sciences, and manufacturing. The time required for each exponential performance step is also declining in many fields, and this is driving the potential for fundamental change across every activity on the planet. In practical terms, we are now past the stage in the life of the curve where it was difficult to gauge that something is happening at all, i.e. we are no longer moving in small steps from 0.01 to 0.02 or 0.04 to 0.08.

At the same time, fortunately, we are not yet at the point where those doublings are so great that the results will overwhelm our understanding and inhibit our capacity to act. To put things in perspective, in my view we are at a relative performance level of around four in most fields, and the next exponential step will take us to eight, rather than a more linear rise to five! This is the very moment when exponential increases are starting to really matter, and technology is now driving exponential changes in every sector of our society, from energy, transportation, communications, and media, to medicine, health, food, and energy.

Witness the recent changes in the car industry—during the past seven years we've gone from electric cars with a range of less than 50

miles to the latest Tesla and BMWi8 promising over 300 miles on a single charge.<sup>2 3</sup> We've also gone from a handful of charging locations to the astounding fact that New York City already has more electric vehicle (EV) charging stations than gas stations.<sup>4</sup> Nearly every month there's a new breakthrough in battery efficiency, a limitation which has for the past decades been one of the biggest barriers to mass adoption of EVs. Soon we'll charge our EVs just once a week, then once a month, and eventually maybe just once a year—and then it seems likely that very few people will still be interested in huge luxury cars with good old gas engines!

Witness the even more dramatic cost decline in human genome sequencing, with the price falling from around US\$10 million in 2008 to approximately US\$800 today.<sup>5</sup> Imagine what might happen when exponentially more powerful supercomputers move into the cloud and become available to every medical facility or lab: The cost of sequencing an individual's genome should quickly drop below US\$50.<sup>6</sup>

Next, imagine the genome profiles of some two billion people uploaded to a secure cloud (hopefully in an anonymized way!) for use in research, development, and analysis—much of it performed by artificial intelligence (AI) running on those very same supercomputers. The scientific possibilities that will be unleashed will blow away anything we have dreamed of, while simultaneously bringing enormous ethical challenges: dramatic longevity increases for those that have the budget, the ability to reprogram the human genome, and—potentially—the end of aging, or even dying. Will the rich live forever while the poor still can't even afford malaria pills?

Such exponential developments suggest that continuing to imagine our future in a linear way will probably lead to catastrophically flawed assumptions about the scale, speed, and potential impacts of change. That may be part of the reason why so many people cannot seem to grasp the growing concerns about technology trumping humanity—it all seems so far away, and, for now, rather harmless because we are only at four on this curve. Issues such as the increasing loss of privacy, technological unemployment, or human deskilling are still

not in-our-faces enough—but this is bound to change very quickly.

It is also important to realize that the biggest shifts will happen because of combinatorial innovation, i.e. by the simultaneous exploitation of several Megashifts and elements of disruption. For example, in chapter 3, we'll discuss how we are increasingly seeing companies combining big data and the Internet of Things (IoT) along with AI, mobility, and the cloud to create extremely disruptive new offerings.

Suffice to say that nothing and no one will be untouched by the changes in store for us, whether they are realized with good will, while ignoring or neglecting to consider the unintended consequences, or with harmful intent. On the one hand, unimaginable technological breakthroughs may dramatically improve our lives and hugely further human flourishing (see chapter 9); on the other, some of these exponential technological changes are likely to threaten the very fabric of society and ultimately challenge our very humanness.

In 1993, computer scientist and famed science fiction author Vernor Vinge wrote:

Within 30 years, we will have the technological means to create superhuman intelligence. Shortly after, the human era will be ended. Is such progress avoidable? If not to be avoided, can events be guided so that we may survive?<sup>7</sup>

### **Welcome to HellVen!**

It is becoming clearer that the future of human-machine relations very much depends on the economic system that creates them. We are facing what I like to call HellVen (i.e. a blend of hell/heaven) challenges (#hellven). We are moving at warp speed towards a world that may resemble Nirvana, where we may no longer have to work for a living, most problems are solved by technology, and we enjoy a kind of universal abundance—sometimes referred to as the *Star Trek* economy.<sup>8</sup>

However, the future could also usher in a dystopian society that is orchestrated and overseen by supercomputers, networked bots, and super-intelligent software agents—machines and algorithms, cyborgs and robots—or rather, by those who own them. A world where non-augmented humans might be tolerated as pets or as a necessary nuisance at best, or, at worst, enslaved by a cabal of cyborg gods; a dark society that would be deskilled, desensitized, disembodied, and altogether dehumanized.

*“You may live to see man-made horrors beyond  
your comprehension.” –Nikola Tesla<sup>9</sup>*

### **Is this a paranoid view?**

Let’s consider what some of us are already witnessing in our daily lives: Low-cost, ubiquitous digital technologies have made it possible for us to outsource our thinking, our decisions, and our memories to ever-cheaper mobile devices and the intelligent clouds behind them. These “external brains” are morphing quickly from knowing-me to representing-me to being-me. In fact, they are starting to become a digital copy of us—and if that thought is not worrying you yet, imagine the power of this external brain amplified 100x in the next five years.

Navigating a strange city? Impossible without Google Maps. Can’t decide where to eat tonight? TripAdvisor will tell me. No time to answer all my emails? Gmail’s new intelligent assistant will do it for me.<sup>10</sup>

As far as man-machine convergence is concerned, we’re not quite in a land where we stay at home while our cyborg doubles live out our lives for us, as in the 2009 Bruce Willis film *Surrogates*.<sup>11</sup> Nor are we yet able to purchase human-like synths that can undertake a range of tasks and provide companionship as in the 2015 AMC TV series *Humans*<sup>12</sup>—but we’re not that far away either.

In this book I will explain why I do not think the dystopian scenario is likely to happen. At the same time, I will argue that we are now facing some fundamental choices when it comes to deciding



and planning how far we will allow technology to impact and shape our lives, the lives of our loved ones, and the lives of future generations. Some pundits may say we are already beyond the point of preventing such changes, and that this is just the next stage in our “natural” evolution. I strongly disagree and will explain how I think humans can emerge as winners in this coming clash between man and machines.

### **Technology and humanity are converging, and we are at a pivot point**

As I started writing this book and weaving the themes into my talks, three important words rose to the top and stood out—exponential, combinatorial, and recursive.

**1. Exponential.** Technology is progressing exponentially. Even though the basic laws of physics may prevent microchips from becoming significantly smaller than they already are today, technological progress in general is still following Moore’s Law.<sup>13</sup> The performance curve continues to rise exponentially, rather than in the gradual or linear way humans tend to understand and expect. This represents a huge cognitive challenge for us: Technology grows exponentially, while humans (hopefully, I would add) remain linear.

**2. Combinatorial.** Technological advances are being combined and integrated. Game-changing advances such as machine intelligence and deep learning, the IoT, and human genome editing are beginning to intersect and amplify each other. They are no longer applied just in specific individual domains—instead they are causing ripples across a multitude of sectors. For example, advanced human gene editing technologies such as CRISPR-Cas9 may eventually allow us to beat cancer and dramatically increase longevity.<sup>14</sup> These are developments that would upend the entire logic of healthcare, social security, work, and even capitalism itself.

**3. Recursive.** Technologies such as AI, cognitive computing, and deep learning may eventually lead to recursive (i.e. self-amplifying) improvements. For example, we are already seeing the first examples of robots that can reprogram or upgrade themselves or control the power grid that keeps them alive, potentially leading to what has been called an intelligence explosion. Some, such as Oxford academic Nick Bostrom, believe this could lead to the emergence of super-intelligence—AI systems which could one day learn faster and out-think humans in almost every regard.<sup>15</sup> If we can engineer AIs with an IQ of 500, what would keep us from building others with an IQ of 50,000—and what could happen if we did?

Thankfully, recursive super-intelligence is not yet on the immediate horizon. However, even without such challenges, we are already grappling with some rapidly escalating issues, such as the constant tracking of our digital lives, surveillance-by-default, diminishing privacy, the loss of anonymity, digital identity theft, data security, and much more. That is why I am convinced the groundwork for the future of humanity—positive or dystopian—is being laid here, today.

We are at a crucial junction, and we must act with much greater foresight, with a decidedly more holistic view, and with much stronger stewardship as we unleash technologies that could end up having infinitely more power over us than we could ever imagine.

We can no longer adopt a wait-and-see attitude if we want to remain in control of our destiny and the developments that could shape it. Rather, we must pay equally as much attention to what it will mean to be or remain human in the future (i.e. what defines us as humans) as we spend on developing infinitely more powerful technologies that will change humanity forever.

We should take great care to not just leave these decisions to “free markets,” to venture capitalists, corporate technologists, or the world’s most powerful military organizations. The future of humanity should not be about some generic, Industrial Age paradigm of profit and growth at all costs, or some outmoded technological imperative

that may have served us well in the 1980s. Neither Silicon Valley nor the world's most technologized nations should end up becoming “mission control for humanity” just because technology generates vast new revenue streams and large profits.

Thankfully, I believe we are still at a 90/10 point right now: 90% of the amazing possibilities presented by technology could play out well for humanity, while 10% might already be troublesome or negative. If we can maintain that balance, or bring it up to 98/2, that would be worth every effort. At the same time, that troubling 10% (even if mostly unintended at this time) may quickly balloon to 50% or more if we do not agree on exactly how we want these technologies to serve humanity. This is clearly not a good time to just “push ahead and see what happens.”

### **Artificial intelligence and human genome editing are the two primary game changers**

The first major force in the realm of exponential technologies is AI, simply defined as creating machines (software or robots) that are intelligent and capable of self-learning—i.e. more human-like thinking machines. The capability of AI is widely projected to grow twice as fast as all other technologies, exceeding Moore's Law and the growth of computing power, in general.<sup>16</sup>

*“By far the greatest danger of artificial intelligence is that people conclude too early that they understand it.” –Eliezer Yudkowsky<sup>17</sup>*

The companion game changer to AI is human genome engineering: altering human DNA to put an end to some if not all diseases, reprogram our bodies, and possibly even end death. Indeed, AI will be a critical enabler of such reprogramming.

These two game changers and their scientific neighbors will have huge impact on what humans can and will be in less than 20 years. In this book, in the interests of brevity, I will focus in particular on AI and deep learning because of their immediate relevance to our future and their enabling role in the development of other “game changer”

fields such as human genome editing, nanotechnology and material sciences.

### **Becoming as God?**

Dr. Ray Kurzweil, currently Google's Director of Engineering, is a great influence on futurist thinking in general and on my own work, but also someone whose views I must often challenge in this book. Kurzweil predicts that computers will surpass the processing power of a single human brain by 2025, and that a single computer may match the power of all human brains combined by 2050.<sup>18</sup>

Kurzweil suggests these developments will herald the advent of the so-called Singularity, the moment when computers finally trump and then surpass human brains in computing power. This is the moment when human intelligence may become increasingly nonbiological, when it may be possible for machines to independently, and quite likely recursively, go beyond their original programming—a decisive moment in human history.

Ray Kurzweil told his audience at Singularity University in late 2015:

As we evolve, we become closer to God. Evolution is a spiritual process. There is beauty and love and creativity and intelligence in the world—it all comes from the neocortex. So we're going to expand the brain's neocortex and become more godlike.<sup>19</sup>

I also believe the point of computers having the capacity of the human brain is not far off, but—God or no God—unlike Dr. Kurzweil, I do not think we should willingly give up our humanness in return for the possibility of attaining unlimited nonbiological intelligence. That strikes me as a very bad bargain, a downgrade rather than an upgrade, and in this book I will explain why I passionately believe we should not go down that road.

Right now, in 2016, computers simply do not have the power to deliver on Kurzweil's vision. I believe the chips are still too big, networks still do not have the speed, and the electricity grid by

and large cannot support machines that would need this much power. Obviously, these are temporary hurdles: Every day we hear announcements of major scientific breakthroughs and, in addition, numerous unpublicized advances are certain to be happening in secret in labs around the world.

We need to be ready for the Singularity: open yet critical, scientific yet humanistic, adventurous and curious yet armed with precaution, and entrepreneurial yet collectively-minded.

### **Science fiction is becoming science fact**

Very soon, machines will be able to do things that once were the sole domain of human workers—blue collar and white collar alike—such as understanding language, complex image recognition, or using our body in highly flexible and adaptive ways. By then, we will no doubt be utterly dependent on machines in every aspect of our lives. We will also likely see a rapid merging of man and machine via new types of interfaces such as augmented reality (AR), virtual reality (VR), holograms, implants, brain-computer interfaces (BCI), and body parts engineered with nanotechnology and synthetic biology.

If and when things such as nanobots in our bloodstream or communications implants in our brains become possible, who will decide what is human? If (as I like to say) technology does not (and probably should not) have ethics, what will happen with our norms, social contracts, values, and morals when machines run everything for us?

For the foreseeable future, despite the claims of AI evangelists, I believe machine intelligence will not include emotional intelligence or ethical concerns, because machines are not beings—they are duplicators and simulators. Yet eventually, machines will be able to read, analyze, and possibly understand our value systems, social contracts, ethics, and beliefs—but they will never be able to exist in, or be a part of, the world as we are (what German philosophers like to call *dasein*).

But regardless, will we live in a world where data and algorithms triumph over what I call androrithms, all that stuff that makes us

human? (I will define exactly what I believe an androrithm is later in this book.)

Again, successive doublings from 4 to 8 to 16 to 32 are a whole lot different in impact than the doublings from 0.1 to 0.8. This is one of our toughest challenges today: We must imagine an exponentially different tomorrow, and we must become stewards of a future whose complexity may well go far beyond current human understanding. In a way, we must become exponentially imaginative.

### **Gradually, then suddenly**

For me, this line from Ernest Hemingway's *The Sun Also Rises* describes the nature of exponential change perfectly:<sup>20</sup>

“How did you go bankrupt?”

“Two ways. Gradually, then suddenly.”

When thinking about creating our future, it is essential to understand these twin memes of exponentiality and gradually then suddenly, and both are key messages in this book. Increasingly, we will see the humble beginnings of a huge opportunity or threat. And then, all of a sudden, it is either gone and forgotten or it is here, now, and much bigger than imagined. Think of solar energy, autonomous vehicles, digital currencies, and the blockchain: All took a long time to play out, but all of a sudden, they are here and they are roaring. History tells us that those who adapt too slowly or fail to foresee the pivot points will suffer the consequences.

Wait and see is very likely going to mean waiting to become irrelevant, or simply to be ignored, outmoded, and to wither away. Thus, we need another strategy for defining and retaining what makes us human in this quickly digitizing world.

I tend to think that markets will not self-regulate and deal with these issues by means of an “invisible hand.” Rather, traditional profit-and-growth-driven open markets will only escalate the challenges of humanity versus technology because these very same technologies are likely to generate opportunities worth trillions of dollars per

year. Replacing human qualities, interactions, or idiosyncrasies with technology is simply too much of a business opportunity to question. For example, Peter Diamandis, a board member of a California company aptly called Human Longevity Inc., often proclaims that increasing longevity would create a US\$3.5 trillion global market.<sup>21</sup> These irresistible new frontiers are likely to trump any such minor concern as the future of humanness.

### **Beyond mission control**

In the end, we are talking about the survival and the flourishing of the human species, and I believe it just won't do to have venture capitalists, stock markets, and the military running the show on their own.

In the near future, we are certain to see some very tough battles between opposing world-views and paradigms with gigantic economic interests facing off against each other, a kind of humanists versus transhumanists' showdown. Now that oil and other fossil fuels are declining as the driving force of politics and military concerns, the US and China are already at the forefront of an accelerating technological arms race. The new wars will be digital, and the battle is being waged for leadership in exponential game changers such as AI, human genome modification, the IoT, cyber security, and digital warfare. Europe (including and especially Switzerland, where I live) is somewhat stuck in the middle, more concerned with what many would see as lofty issues such as human rights, happiness, balance, ethics, and sustainable and collective well-being. As I'll explain, I believe addressing these concerns is actually our big opportunity here in Europe.

There are already global tribes of opinion leaders, serial entrepreneurs, scientists, venture capitalists, and assorted tech gurus (and yes, futurists as well) busy promoting a quick voluntary departure from humanism altogether. These techno-progressives are urging us to "transcend humanity" and embrace the next step in our evolution, which is, of course, to merge biology with technology, to alter and augment our minds and bodies and, in effect, become

superhuman, ending disease (good) and even death— an alluring yet bizarre quest.

Interest in this notion of transhumanism is on the rise, and to me it is one of the most troubling developments I have observed in my 15 years of being a futurist. It is frankly a rather delusional idea to try and achieve human happiness by seeking to transcend humanity altogether through technological means.

For context, here are two contrasting positions on the concept, as laid out by transhumanism advocate and 2016 US Presidential Candidate Zoltan Istvan and the philosopher Jesse I. Bailey:

**The Protagonist.** Istvan writes in his 2013 novel *The Transhumanist Wager*:

The bold code of the transhumanist will rise. That's an inevitable, undeniable fact. It's embedded in the undemocratic nature of technology and our own teleological evolutionary advancement. It is the future. We are the future, like it or not. And it needs to [be] molded, guided, and handled correctly by the strength and wisdom of transhumanist scientists with their nations and resources standing behind them, facilitating them. It needs to be supported in a way that we can make a successful transition into it, and not sacrifice ourselves—either by its overwhelming power or by a fear of harnessing that power.

You need to put your resources into the technology. Into our education system. Into our universities, industries, and ideas. Into the strongest of our society. Into the brightest of our society. Into the best of our society. So that we can attain the future.<sup>22</sup>

**The Humanist.** Challenging this position, Bailey writes in *The Journal of Evolution and Technology*:

I argue that by threatening to obscure death as a foundational possibility for *dasein* (human existence), transhumanism poses



the danger of hiding the need to develop a free and authentic relation to technology, Truth, and ultimately to *dasein* itself.

Transhumanists often make one of two claims: Either the body we inhabit now will be able to live for hundreds of years or our consciousness will be downloadable into multiple bodies. Either of these positions (in subtly, but importantly, different ways) alienates human experience from central aspects of the finitude of embodiment.

Heidegger locates being-toward-death as central to the call to authenticity, and away from lostness in the they-self (for whom technological enframing holds sway); by threatening our awareness of our own mortality, transhumanism thus threatens to occlude the call to authenticity, just as it occludes the need for it.<sup>23</sup>

It is clear that technological determinism is not the solution, and that the prevailing Silicon Valley ideology that argues, “Why don’t we just invent our way out of this, have loads of fun, make lots of money while also improving the lives of billions of people with these amazing new technologies?” could prove to be just as lazy—and dangerous—as Luddism.

In respectful contrast to some transhumanists’ rather Cartesian or reductionist views of humanity’s future (i.e. vastly simplified and reduced to looking at the world—and people—as a giant machine), this book will strive to outline a mindset and Digital Age philosophy that I sometimes call exponential humanism. Through this philosophy, I believe we can find a balanced way forward that will allow us to embrace technology but not become technology, to use it as a tool and not as a purpose.

To safeguard humanity’s future, we must invest as much energy in furthering humanity as we do in developing technology. I believe that if we want a world that remains a good place for humans, with all our imperfections and inefficiencies, we must put significant resources (monetary and otherwise) into defining what a new kind of exponential humanism may actually entail. It will not be enough to just invest into the technologies that promise to make us superhuman—as we

will soon ride on the shoulders of machines whose workings we don't even understand any more.

If we don't become more proactive on these issues, I worry that an exponential, unfettered, and uncontrolled intelligence explosion in robotics, AI, bioengineering, and genetics will eventually lead to a systematic disregard of the basic principles of human existence, because technology does not have ethics—but a society without ethics is doomed.

This dichotomy is arising everywhere: Pretty much everything that can be digitized, automated, virtualized, and robotized probably will be, yet there are some things we should not attempt to digitize or automate—because they define what we are as humans.

This book explores where exponential and converging technologies might take us in the next ten years, highlights what is at stake, and explores what we can do about it today. No matter what your philosophical or religious persuasion, you will probably agree that technology has already entered our daily lives to such a vast degree that any further exponential progress will surely demand a new kind of conversation about where the advances are taking us, and why. Just as technology is literally about to enter our bodies and biological systems, it is time for a tribal pow-wow—the most important conversation the human tribe may ever have.

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# About The Author

Listed by *Wired Magazine* as one of the top 100 most influential people in Europe (2015), Gerd Leonhard's work focusses on the future of humanity and technology, digital transformation, big data, automation, AI and robotics, media, content, marketing and advertising, telecommunications, culture and tourism, banking and financial services, government and leadership. In his keynotes, presentations, workshops and advisory sessions Gerd often addresses topics such as digital darwinism and the challenges of digital transformation, the redefinition of human-machine relationships, the future of work and jobs, privacy in the era of big data, the sharing economy, and many more. His presentations are renowned for a hard-hitting and provocative yet inspiring, humorous and motivating style.

Gerd is a much sought-after speaker, having presented at more than 1500 events in 50+ countries since 2005. His list of clients include Google, Sony, UBS, Mastercard, Unilever, Lloyds Bank, WWF, Nokia, *The Guardian*, Telkom Indonesia, Siemens, RTL, ITV, BBC, France Telecom, Orange, Deutsche Telekom, MTN, *The Financial Times*, DDB, Ogilvy, Omnicom, The EU Commission, Mandarin Oriental Hotel Group, VISA, and many others. He resides in Zürich, Switzerland.

Further information on Gerd Leonhard and his work:

Gerd's show reel:	<a href="http://www.gerd.io/2016ShowReel">www.gerd.io/2016ShowReel</a>
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