



## **The Driver in the Driverless Car: How Our Technology Choices Will Create the Future**

*Vivek Wadhwa , Alex Salkever*

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Technology is advancing faster than ever-but is it for better or for worse? On the one hand, astonishing technology developments from personalized genomics to self-driving cars could make our lives healthier, safer, and easier. On the other hand, those same technologies could create a frightening and alienating future. How can we make appropriate decisions about whether to adopt new technologies? Vivek Wadhwa and Alex Salkever propose that we ask three questions: Does the technology have the potential to benefit everyone equally? What are the risks and the rewards? And does the technology more strongly promote autonomy or independence? To showcase the power of these questions, they subject a host of new and potential technologies to them-but it's up to the reader to decide.

## **The Driver in the Driverless Car: How Our Technology Choices Will Create the Future Details**

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# From Reader Review The Driver in the Driverless Car: How Our Technology Choices Will Create the Future for online ebook

## Mal Warwick says

“Not long ago, I was very pessimistic about the future. . . Today, I talk about this being the greatest period in history, when we will solve the grand challenges of humanity and enter an era of enlightenment and exploration such as we saw in my favorite TV series, Star Trek.” Thus begins *The Driver in the Driverless Car: How Our Technology Choices Will Create the Future*, by Vivek Wadhwa and Alex Salkever.

An authoritative look at technology’s potential

In this fascinating and authoritative look at the potential of technology, both positive and negative, Wadhwa demonstrates intimate knowledge of the latest developments in such diverse fields as biomedicine, robotics, education, the Internet of Things, and prosthetics. Unlike the unreservedly optimistic scenarios presented by Ray Kurzweil and Peter Diamandis, Wadhwa paints an almost symmetrical portrait of technology’s future, extolling its promise but vividly describing its potential to harm us. (I previously reviewed *Abundance: The Future Is Better Than You Think* by Diamandis.) Ray Kurzweil famously speaks about the exponential rate at which technology advances. Wadhwa bases his argument on the same formula but reaches different conclusions. “You will see that there is no black and white,” he writes; “the same technologies that can be used for good can be used for evil in a continuum limited only by the choices we make jointly.”

It’s a cliché to remark on the speed of technological change, but the reality is nonetheless staggering. As Wadhwa notes, “the amount of information buzzing over the Internet is doubling roughly every 1.25 years. . . We are now creating more information content in a single day that we created in decades or even centuries in the pre-digital era.” He adds, “the iPhone 11 or 12 will have greater computing power than our brains do.”

Three questions to ask about any new technology

*The Driver in the Driverless Car* is organized around three broad questions, which Wadhwa poses in connection with each of the technologies he discusses: “1. Does the technology have the potential to benefit everyone equally? 2. What are the risks and the rewards? 3. Does the technology more strongly promote autonomy or dependence?” He is merciless in responding to these questions. Only two of the many technologies treated in this book emerge with unreservedly positive reviews: driverless cars and trucks, and solar power. Everything else comes up short, from the biomedical miracles emerging from laboratories on a daily basis to the Internet of Things. In a great many cases, the new technologies render us susceptible to identity theft or worse. For example, Wadhwa fears the loss of privacy that will come from having all our appliances connected to the Internet and to each other: “I am not looking forward to having my bathroom scale tell my refrigerator not to order any more cheesecake.”

A sometimes fantastic vision of the future

Disputing Wadhwa’s sometimes fantastic vision of technology’s future may be a fool’s errand. However, it’s difficult not to remain skeptical about some of his predictions. For example, he envisions 200-mile-per-hour driverless cars guided by a web of sensors on the roadways. Despite the minuscule cost of individual sensors, it’s hard to see where the money might come from to implement such a system. Can you imagine how much it might cost to embed sensors along a 200-mile stretch of highway, much less the full 381 miles from San Francisco to Los Angeles? Similarly, the author envisions a sea change in our transportation system within

the foreseeable future, with driverless electric cars available on command everywhere, private vehicles and stop lights eliminated, and parking lots a thing of the past. Perhaps, eventually, all this might come to pass. But is it realistic to expect that politicians will resist the screaming complaints from auto manufacturers, oil companies, service station and parking lot owners, and individual citizens by the millions?

Wadhwa emphasizes throughout *The Driver in the Driverless Car* that only grassroots citizen pressure can force politicians to enact the legislation necessary to permit the widespread use of some of these technologies. For instance, FDA approval may be necessary for the acceptance of many of the biomedical innovations Wadhwa describes. And state governments everywhere will be required to allow driverless vehicles to travel on their roads, a prospect that does not seem imminent. The future Wadhwa envisions may eventually come to pass. But we would be naive to expect no bumps, twists, and turns along the way.

#### About the authors

Vivek Wadwa has an extraordinary résumé. An Indian-born American futurist, he lives in Silicon Valley and researches technology developments there. Wadhwa holds distinguished positions at Carnegie Mellon and Duke and is a globally syndicated columnist for the Washington Post. In 2012, *Foreign Policy* magazine named him one of the world's Top 100 Global Thinkers. Wadhwa calls his co-author, Alex Salkever, V.P. of Marketing Communications at Mozilla, his "writing guru." The two also co-authored *The Immigrant Exodus: Why America Is Losing the Global Race to Capture Entrepreneurial Talent*, which the *Economist* named a Book of the Year in 2012.

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#### **Pam says**

This book focuses on the future of technology and how it will impact society. It doesn't just focus on the driverless car, although it does spend a good bit of time on the driverless car. It also discusses advances of technology in medicine, and other areas of our life. I think the author made a lot of good points and does a good job of discussing the potential risks associated with the technology changes and the book is written in an easy to read, conversational tone. However, I think the author ends on too optimistic a tone. The last chapter is titled "Almost Free Energy and Food." And the last sentence is quoting Captain Picard from Star Trek: "The acquisition of wealth is no longer the driving force in our lives. We work to better ourselves and the rest of humanity."

The author presents an almost utopian idea of the future based upon technology. However, the reality is that whatever happens in the future there will always be those that have more than others and utopia will never be achieved. But the overly optimistic end of the book was my only real criticism and the rest of the book does a really good job of discussing the potential risks.

I received a free copy of this book from Goodreads but my opinions are my own.

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#### **Kathy Duffy says**

I found this book to be exciting and thought provoking. Some of the upcoming technological changes coming in our immediate future are thrilling. The author does evaluate each of the areas and tries to present the both the up and the downside of that particular technology and then asks if the technology has the potential to benefit everyone equally, what are its risks and rewards and does a particular technology

promote autonomy or dependence.... Lot of food for thought here.

One of the things that impressed me is how recent his research is -- citing articles as late as fall of 2016. Although the author does present some of the downsides, I think he has more faith in mankind than I currently hold. And some areas I wanted more information on.

Some of the technology I found most surprising is that happening in the legal fields and the most amazing to me were the medical advances and I was stunned to be offered one of the advances only a week after reading about how it will soon be available....

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### **Arvind says**

This is a well researched book to keep up with the latest technology breakthroughs (across AI and Robotics, Gene-editing, Precision medicine, Microbiomes, IoT, Shared, Connected, Autonomous vehicles, etc). The author writes lucidly so that even a layperson can understand, has a very optimistic view on the future of technology and how it will evolve (continue to improve and costs will reduce on an exponential curve) as well as how humankind will use it (for betterment of all).

He does explore the downsides of technology, the risks involved and raises questions on the ethics of gene-editing, concerns on privacy of our data being collected and traded by tech companies, cyber security risks, etc. While author does address the issue of choices we need to make to influence technology policy it is covered perfunctorily.

However, inspite of this, it is book worth reading to understand how technology could shape our future world and its straight out of Science Fiction.

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### **Anu says**

Concise little book with a sweeping panorama of technological progress over the past couple of decades. For those not in the tech industry, this is a thoughtful introduction to the fundamental changes in the field of tech. And for those of us in the tech industry, the framework used for classifying tech progress in terms of qs like "Is the tech more beneficial than harmful?", "Will the tech benefit larger segments of humanity or remain in the hands of few" is an interesting lens to look through.

Ironically, the segment on autonomous driving was the only one that I found somewhat boring, possibly given I am fairly familiar with that area. The chapters on eugenics, drones & personalized medicine were fascinating. Overall, a nice summary of tech advances and implications for our future lives.

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### **Soren Molander says**

This book gives straighforward and for the most part a positive view of how technology is transforming society. Unlike Peter Diamandis book Abundance, he clearly points to both positive and negative sides which makes the reading more balanced and interesting. He does this by asking essentially three questions: does the technology have the potential to benefit everyone equally? What are the risks and rewards? Does it foster dependence or autonomy? I enjoyed the positive outlook, and I agree that we are undergoing rapid change in society where many old business ideas are rapidly become obsolete and new technology in health

car and transport will see a bright future. Like other books written by entrepreneurs, however, it neglects the effects that this transformation will have on society. In the best of worlds, states and leaders will quickly adapt and make sure everyone will get a slice of the pie. I for one am more pessimistic: I think we need a fundamental change of the economic system that focuses on natural resources and well-being rather than money and production. So, I would recommend this book together with e.g. *The End of Growth* and *Doughnut Economics*. Technology will transform society for the better only if fundamentally reform our broken economic system.

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### **Stephen says**

Started this yesterday and finished it today - fascinating summary of all the technological changes around the corner - driverless cars, medical treatment targeted to the individual, cheap energy and water, etc etc. Things that could transform the world for good and help bridge existing huge gaps between the "have" and "have-nots" but also scary warnings of hacking, job losses, "Terminator" like killer robots as well though. And all this to happen in five to ten years in most cases, as technology is now on an exponential curve apparently. Very easy to read summary of where we are and where we could be heading. Just hope it's a "Star Trek" world and not a "Mad Max" one (to quote the author) but it looks like we will be finding out fairly soon anyway !

27 Nov 2017 Update

Here is a fascinating and pretty terrifying video on the subject matter of this book:

<https://www.youtube.com/watch?v=m0wy0...>

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### **C. Hollis Crossman says**

The page-and-a-half conclusion of *The Driver in the Driverless Car* is titled "So Will It Be *Star Trek* or *Mad Max*?". But that question is never really addressed. Wadhwa doesn't allow that the future might resemble *Mad Max*, and instead focuses on how it will resemble *Star Trek* because "humanity will rise to the occasion and uplift itself because it always has" (pg. 192). I can't pretend to know what he's talking about, but I can demonstrate the key flaw of this book as revealed in the false choice of the concluding question: the future as Wadhwa envisions it isn't *Mad Max* or *Star Trek*, it's *Battlestar Galactica* and *V*.

The book is supposedly an examination of the ethical implications of current rapidly-advancing technology. There are three main questions: "Does the technology have the potential to benefit everyone equally?", "What are the risks and the rewards?" and, "Does the technology foster autonomy or dependency?". Each of these forms the basis for a section of the book, but in reality each is addressed willy-nilly with appropriate discussions not limited to the corresponding section. This makes it somewhat difficult to follow Wadhwa's lines of reasoning. It also means that he's able to avoid having to answer really difficult questions, since he has no systematic program in place for doing so. One senses that when Wadhwa doesn't want to provide a certain answer, he simply moves on to another issue.

Wadhwa loves pronouncements. On page 44 he says, "Humanity as a whole can benefit from having intelligent computer decision makers helping us. A.I., if developed correctly, will not discriminate between rich and poor, or between black and white." Well, okay. But even if this is true, there are plenty of other lines

by which humans can be segregated and divided. We've already seen how Google and Facebook (or at least employees at the latter) have exerted their biases ideologically, and we can't forget that it is flawed and biased humans that create algorithms.

He also loves obfuscation. In Chapter 7, "We Are Becoming Data," he talks about how A.I. has the potential to help us maintain better health. One specific area of concern is the ability to watch our weight—Wadhwa explains that obesity is a continuing problem, despite a plethora of diets and exercise plans. He concludes that modern technology to some extent does, and increasingly will, help us watch what we eat and more faithfully adhere to our particular dietary needs. Right in the middle of the discussion is this jewel of a line: "What makes it so hard for us to fight obesity has remained a mystery" (pg. 66). Granted that there are medical conditions which make it difficult or impossible to lose weight or maintain a healthy weight, the answer which apparently eludes Wadhwa is that it's way more fun to eat a bag of Cheetos and watch Netflix than it is to eat veggies and do pushups.

But it's Wadhwa's less obviously problematic statements that are really dangerous. In Chapter 11 (and elsewhere throughout the book) he looks at the future of bioengineering and personalized, genomic medical treatment (something he views with nearly unmitigated optimism). He envisions a future in which we print medicines and prosthetic parts on 3D printers at home, and when "we will all be biohackers and amateur geneticists, able to understand how our genes work and how to fix them" (pg. 123). Even if we do end up diagnosing and treating our own ailments, it's quite a leap to assume that we will also *understand* any aspects of the process. People do things all the time that turn out for their own good but which they don't understand; assuming that lay understanding will accompany technical advancement is naive at best. Furthermore, Wadhwa never addresses the issues of hypochondria or Munchausen by Internet (where subjects feign illness online in order to gain attention or sympathy).

Later, in a similar chapter ("Designer Genes"), Wadhwa talks about advances in genomic therapy made possible by CRISPR technology. It's weird stuff, but you can read more about the technical aspects elsewhere. What's especially disturbing here is that there's no consideration of the ethical implications beyond the possibility that DNA modification could result in serious illnesses or beings that are psychotically predisposed to murder. "Editing DNA?" Wadhwa seems to say. "Fine! Just as long as it doesn't hurt *us*." As if to confirm this perspective he chillingly says, "To allow these technologies to function safely outside the lab, researchers must put in place multiple mechanisms to ensure that engineered organisms can be, for lack of better words, killed on demand, and quickly" (pg. 137). For lack of better words, indeed.

His perspective on the Internet of Things is scarcely less assuring: "The I.o.T. will be everywhere, from heart-rate monitors in your watches to breathing monitors stitched into your child's pajamas. It will help us learn from our behaviors, manage our environment, and live a richer life" (pg. 157). While he does temper this with the reminder that all this constitutes a massive invasion of privacy and even suggests he won't buy in until the space is better regulated, he isn't opposed to these technologies on a fundamental level. He really thinks this kind of comprehensive, constant analysis has the potential to improve our lives. He never addresses the possibility that it will instead make us all deeply neurotic and schizophrenic as our every movement becomes an accusation against our lifestyle choices, as we are trapped in our own perfectly personalized prisons of legalism and reproach.

By the time the book touches on transhumanism, Wadhwa's views are predictable. We'll be faced with "interesting choices" (pg. 175) in the future about whether or not to upgrade our eyes or get super-limbs that never wear out. Ethical implications about redirecting evolutionary trends go unaddressed; instead, we just need to make sure we don't ruin anything (whatever that means in Wadhwa's largely amoral worldview). By the time the last chapter drew to a close and Wadhwa was babbling on about the near future when everyone

has plenty of water and clean energy, my imperfect eyes had long ago gone glassy and my non-hyperlinked brain was immensely excited to move on to another book.

There are two fundamental problems with this book that account for all the other problems that crop up on nearly every page. The first is that Wadhwa makes a basic assumption about technological advancement: that it is always good, no matter what. The dangers he sees don't have anything to do with technological advancement as such, but only with peripheral concerns, with not knowing enough yet about possible side-effects. He never asks whether we should always move forward; he accepts that as an a priori truth, and rests his ethics on that foundation. Technology for him does not exist in a teleological context; for him, it *is* a teleological context. Technological advancement, therefore, is always right, just so long as we don't screw it up. Overreach is apparently not something humans are capable of.

The second major flaw with Wadhwa's entire discourse is his vision of human nature. He really seems to believe that human beings, freed from the constraints of having to drive cars or even go to work, will spend their newfound free time in creative pursuits and serious learning. Does he not know any real people? It's entirely possible that he doesn't, living as he does in Silicon Valley and having a hell of a lot of money (as he indicates many times, sometimes subtly and sometimes not). At any rate, he seems not to realize that average humans when given smartphones are going to buy things, look at porn, and amuse themselves with meaningless games—not write symphonies, read history, or paint masterpieces. Worse, he raises the question of whether we will be content with the loss of meaning inherent in losing our jobs to robots....and refuses to address it meaningfully, opting to believe instead that we'll all be happier without jobs but not offering any meaning-producing alternative.

There are so many good books about the ethics of modern technology (from all sides of the issue) that I heartily suggest you avoid this one. Which is probably not a surprising verdict when the author describes Singapore as "a small, landlocked island" (pg. 150).

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### **Jordan Hatch says**

An interesting and inciteful book on different technologies, how they are progressing and how they may affect us in the future. The author is overall optimistic that the future is bright and will greatly improve lives. The greatest concern is privacy, with every movement being tracked big brother will have power like never before.

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### **A.S. Oberoi says**

"In pursuit of a Star Trek future: In times of unprecedeted change, we as individuals and institutions can have extraordinary leverage and influence if we marshal the passion, knowledge, and resources necessary to achieve great things. The Driver in the Driverless Car empowers and guides us to make the most of today's enormous possibilities in exponential technologies and a future of abundance that will transition us to a New Age. A provocative and extremely important new paradigm of its authors' insights about new kind learning in the digital age, a culture of innovation, responsibility, reform, and opportunity,' appropriate for a world characterized by continual change. This is a must read for anyone interested in the future of humanity. Pearls of wisdom leap from almost every page. Futuristic, Authoritative, Provocative. Visionary."

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## **Andrew Chong says**

The Driver in the Driverless Car is truly a refreshing read. The tale of the digital age coming to disrupt mankind (and womankind) has been foretold for the past decade, however few realised that it has already dawned upon us.

Vivek (“the author”) successfully conveys this in an exciting yet cautionary manner.

Below are some supplementary elaborations and alternative views on several snippets within the book that I found to be interesting. I recommend reading the book and my notes concurrently.

I do apologize for the long 'research paper' review. However, i do hope that my notes will be able to further provoke thoughts and discussions into the revolutions that come with the digital age:

### **INTRODUCTION**

1) Page xi; Para 1, Line 1 - “..drive off a cliff to spare a busload of children at the cost of killing the car’s human passenger?”

Futuristic autonomous cars may also be programmed to discriminate against other factors, such as age, ranks or social class. To categorise some as above others.

Eg: A normal civilian vs an ambassador/Prime Minister of a country.

In a definite-casualty scenario, how will the car determine who survives. Ethical issues that we have been side-lining for a long time may finally arise, like how do you place a value on a life?

### **CHAPTER 2**

2) Page 8; Para 1, Line 6 - “The Concorde was and, ironically, remains the future of aviation,”

It is true that the discontinued Concorde remains the benchmark of commercial carriers that can break the sound barrier. However many military-grade aircrafts do this, and are already at multiple levels of supersonic, reaching beyond even Mach 6 (six times the speed of sound).

The challenge here is that our advancement in propulsion technology far exceeds our material and dampening technology. Due to the size of commercial airlines, the continuous sonic booms (rapidly bursting through walls of compressed air) makes airline comfort impossible and causes immense strain to the plane components.

A way forward could be in the commercial space rockets that Elon Musk has proposed, allowing crafts to travel just above the Kármán line (boundary between Earth's atmosphere and outer space), thus reducing particle resistance.

3) Page 10; Para 3, line 3 - “..changes we now face can trace their onset and inevitability to Moore’s law.”

Moore's law is an exponential concept, and therefore would eventually hit its plateau. The author acknowledges this in later chapters.

There is indication that our binary chips and processors would eventually be limited by further decreases in size to only a third or a quarter of the current available models.

One of the future modes of data storage currently being developed is the 5- dimensional (5D) quantum computing. A way to compress data into smaller space using more dimensions, thus allowing more complex sequences and algorithms.

Our human DNA functions similarly, using our 4D A-T-C-G gene sequences. This microscopic method of data storage is one of the hallmarks of how lifeforms can be so exceedingly complex.

## CHAPTER 3

4) Page 20; Para 3, Line 2 - “..children all around the world, in every country, will have an equally good education.”

This point is further elaborated by the author in ‘Chapter 6: Remaking Education with Avatar and A.I. ‘. The author describes a systematic restructuring of the education system that can be run by AI. Leading from this, let us explore another related concept, the parenting system.

A.I. could also end up changing the fundamental way of how we raise children. Could parenting cease to be a thing altogether?

Families are an evolutionary mammalian structure used to raise and care for newborns and the young. It is intrinsically a mammalian structure because unlike reptiles or birds, mammals take a relatively long period of time to reach maturity. Under a family structure, safety and education can be provided to ensure the highest possible rate of survival.

However with technology, this process may soon be obsolete. In future societies, safety and security will be more easily provided, and children can be inculcated with values and skills in a standardized environment.

Robots that can mimic and display emotions and affections, as well as monitor mental health, are already in existence and in the near future will be able to provide the adequate amount of psychological support.

To add to this, there already exists inefficiencies to a human family group structure. The issues of most mental health disorders developing in a person's early years (estimates anywhere between 0 – 20 years of age) is widely debated. In a modernized age of increased complexity, most parents don't have the time and resources to provide ideal care to their young.

With all this in mind, could a standardized A.I. parenting system be able to produce more effective human beings? Will we adopt a ‘Vulcan’ approach that produced the likes Spock from movie “Star Trek: Into Darkness”?

5) Page 25; Para 3, Line 3 - “..ethical standards for human genome editing..”

Editing of the human genome is another endeavor that is currently being tested via a process called CRISPR.

It is derived from specific bacteria that survive by adopting genetic material from attacking viruses, thus becoming immune to a similar attack.

CRISPR then utilizes these bacterium to modify genetic code, by cutting and replacing specific gene sequences. This has currently been creating waves of ethical debates among the scientific community. The author explains further in 'Chapter 7: We Are Becoming Data; Our Doctors, Software'.

## CHAPTER 5

6) Page 44; Para 3, Line 2 - "...an A.I., no matter how well it emulates the human mind, has no genuine emotional insight or feeling."

Caution: Controversial but remains very interesting topic of debate in the tech/science community.

What does it mean to have 'genuine' emotional insight and feeling?

We already know that the brain physiology that generates our emotions are nothing more than enzymes, hormones and chemical interactions. Essentially data and information that has been encoded biologically into our genes for centuries.

Let's take 'Love' as an example, a biological mechanism to ensure the following:

1. Finding of a suitable mate to replicate genetic data
2. Sustained caring for offspring till biological maturity is reached  
(Especially in mammals where rate of development is slow)

Love, like many other instincts that we have, is the direct translation of instructions coded into our genes. In this way, it is possible to program or reprogram your brain by influencing this chemical environment. For example, an experiment using drugs to suppress vasopressin in prairie voles had resulted in decreased levels of romantic bonding between pair voles.

In this sense, a robotic program coded with similar parameters to achieve the same outcomes can easily be designed. An A.I. can be programmed to recognize that its primary purpose is caregiving. As the lines separating the ways signals are transmitted in a biological mind v.s. a mechanical mind become increasingly blurred, so may our ability to determine what 'genuine emotions' truly are.

## CHAPTER 7

7) Page 66; Para 3, Line 7 - "...the interplay of the bacteria in our guts."

The mention of the human gut microbiome can be found throughout this chapter and in other parts of the book. Few actually realise how large a role the ecosystem our body's bacteria plays in our health and also in regulating or deregulating it.

There are cases of the medical usage of fecal transplant resulting in direct negative health impacts to the recipient.

Eg: In 2015, A fecal transplant from an overweight donor to treat a recipient's

chronic diarrhea, caused the recipient to become overweight several months later.

How? Simply put, a large portion of serotonin in our bodies are produced by gut microbiomes. Serotonin is used in the transmission process between nerves and can therefore dictate our moods and how we think. Research has shown that the gut microbiome uses this to directly influence how our brains function.

8) Page 80; Para 2, Line 3 - “The company 23andMe ran afoul of regulators because it was telling people what diseases they may be predisposed to.”

Services such as 23andMe stem from the international gene sequencing initiative, the Human Genome Project. The human genome is basically a blueprint of human being.

Currently the two main applications are lineage tracing and medical heritage. Technological advances will soon see more and more applicative uses of genome testing such as predictive models to project an individual’s development in controlled environments.

An abuse of this could result in a dystopian weapon-of-mass-destruction like that seen in the blockbuster ‘Captain America: The Winter Soldier’, where artillery mounted on aircrafts or satellites could eliminate millions by detecting their genetic signatures.

## CHAPTER 8

9) Page 86; Para 3, Line 7 - “..things that kids learn to do up to age ten ...are actually the hardest things to get a robot to do.”

In this section, the author highlights a common misconception with robotics and A.I.. Specifically the over-exaggerated speed of learning of A.I.. At present, the speed of learning of a human far outstrips any robotic mind. What would take us 10 – 20 attempts to learn a task such as riding a bike, would take a robot easily 200,000 attempts.

A.I. learns via simulations, either virtual, real-time or both. Hundreds of thousands and sometimes millions of simulations are run in order to educate an AI on all the possible scenarios in completing a specific task. Google’s driverless car had to drive hundreds of thousands of miles in a monitored system before being allowed to gather data autonomously on public roads.

In comparison, the human brain, is made up of trillions of synapses. The exponential growth of robotics is amazing, but there’s still a long way to go before they catch up to our human brain, the product of 200,000 years of human evolution.

## CHAPTER 11

10) Page 126; Para 1, Line 1 - “..declared a war on cancer. The president wanted to be able to declare cancer eradicated..”

Yes, the term ‘cure’ for cancer is indeed inaccurate and misleading. Cancer as we know, is the uncontained and unregulated mutation of genetic material. It is when a cell performs unnaturally. Mutation however, is perfectly natural. As long as evolution exists, so will cancer.

The way forward then could be to disrupt evolution itself. When we begin to have a better control over our own genetic material via gene editing, when we can remove the ‘randomness’ in evolution ...Then we can eliminate cancer and mutations, and ironically eliminate evolution itself.

## CHAPTER 12

11) Page 146; Para 5, Line 2 - “..A.I. will keep all the cars moving in perfect order, cars could move at ludicrous speeds..”

With driverless cars, automobiles will indeed be able to move in perfect order and traffic jams will eventually cease. The mechanics of traffic jams are simple and are the result of human egoism and the collective traffic volume.

To understand this, a comparison can be made with ants. Why is it that ants who also travel in long lines back-to-back, do it so fluidly without stoppage, even when more ants join the column at undetermined intersections? Well, because travelling ants usually share the same singular objective, to move food towards the nest.

Humans on the other hand, are egoistical and self-serving. We all want to get somewhere as fast as possible with little or no consideration for the group as a collective whole.

Therefore here and there, periodic braking and lane switching occurs that benefit the individual at the expense of the drivers around him/her.

Eg: Say for every advantageous movement person A makes, four others are found disadvantaged. The cost-benefit ratio is 4:1. This slowdown creates a ripple effect with more and more drivers taking selfish movements, eventually causing a standstill traffic jam.

With A.I. a ‘hive’ mentality will be possible, with many machines connected to a single system that serves to facilitate efficient transportation for all.

12) Page 153; Para 1, Line 1 - “..self-driving cars will easily tip the balance ..I’ll forgo the flights.”

Indeed with driverless cars, it is exciting on how the balance may tip against other forms of transportation. But at the same time, planes and trains are also evolving just as quickly as cars.

For aircrafts, earlier I mentioned that we already have the propulsion capabilities, all that’s needed now are a few tweaks in material science that can support prolonged supersonic travel.

The technologies proposed by Elon Musk, projects us travelling halfway around the globe in just under an hour.

The Hyperloop is looking at capsule travel in a near-vacuum environment, eliminating various form of resistance and creating energy efficiencies.

As advanced as it may be, there are limitations to how fast and efficient ground transportation can get. It is the balancing of forces acting on an object’s center of mass, air lift generated by speed v.s. maneuverability enabled by ground-resistance.

Even in nature we observe the physical limitations of mobility ...The fastest land animal in the world clocking in at over 70mph is the cheetah, but yet most birds easily top that speed with some falcons maxing

out at over 200mph.

What the future holds, no one can truly fathom, but perhaps it begins with 300mph driverless cars!

## CHAPTER 14

13) Page 170; Para 2, Line 1 - “The pairing of personalized 3-D printing with medical prosthetics or enhancement is happening in many places ..”

Another advantage of 3D printing, especially of biological tissues and appendages is the logistical convenience. By sending blueprint information instantaneously to a given location, the expensive costs of transport and preservation is removed.

In the future, there will no longer be risks of losing preserved organs such as hearts or lungs travelling across several states or patients dying due to organs not arriving in time.

The military landscape would also be altered. Soldiers would be able to receive 3D-printed skin grafts immediately decreasing risk of further infections, and replacement of vital organs can be done on-site, saving more and more lives.

14) Page 176; Para 3, Line 4 - “..the digital keys to something akin to the fountain of youth.”

Speaking about the search for the ‘fountain of youth’, Nano Biotechnology is another unprecedented frontier. The idea is to engineer nanomites (nanites) capable of biological restoration at a cellular level.

One such function could be to supplement the body’s immune system.

Eg: Our white blood cells and T-helper cells generally do a good job in keeping antigens at bay, however sometimes they just plain screw up. Either by failing to detect certain mutated antigens or by misidentifying and destroying the body’s own local cells like that of Leukemia patients.

What if we could reprogram our body to accurately detect, identify and treat anomalies as they arise? The nanites would monitor the body’s cellular health day and night, learn to isolate pathogens or areas of abnormal behavior, then deliver precise treatment or prepare the body for heavy surgical procedures.

At a more advanced level, these nanites may even be able to aid in cell regeneration, and even slowing down the process of ageing.

It would be like having a Hospital in your own Body.

## CHAPYTER 15

15) Para 180; Para 3, Line 4 - “The Earth is literally bathed in energy.”

Yes, it is. But beyond that, the Earth IS energy.

Einstein’s defining formula revealed to us that anything with mass is energy. The challenge for us then is to find newer ways to harness energy and to scale up this process.

New technological developments range from basic, to generate more efficient conversion processes of

existing energy sources (fossil fuels currently generate less than 40% of usable energy); to the concepts bordering on science-fiction such as the Dyson Sphere, a gargantuan space structure orbiting the sun to capture solar radiation.

Whatever the method, the author's point is clear that our near future will not be one devoid of energy.

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### **Saurabh Palan says**

An almost up-to-date summary of the latest trends & technology in Silicon Valley and around the world. It is an interesting and easy read. Also it's give you a fresh and positive outlook of what good can come out of all the technology.

News articles and tech blogs provide a minute by minute updates and recently a very negative out-look of technology and how it will shape human life for worse. But this book paints a long term picture and all the good that we can expect from the recent trends. Also it's a glimpse into the future, considering if all goes as planned.

Vivek definitely is the right person and he has done a fantastic job of painting a picture of the future that is not just Scifi but soon to be a reality.

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### **Frans Saxén says**

Vivek Wadhwa has written a brief book summarizing some of the key technological changes going on, and their implications for the future. We are either heading towards Star Trek, with peace and abundance; or Mad Max, with inequity and unrest.

The author looks at this through the prism of Moore's law, first highlighting how the decreasing cost of computing has got us the self driving cars, drones, automated diagnostics and other advanced technologies of today, and where the continued march of Moore's law will take these technologies in the near future. These technologies are analyzed through the questions whether they will benefit everybody equally, are the risks and rewards in balance, and do they foster autonomy or dependency. These are sensible questions, but as the author himself notes, the implications of whether a technology fosters autonomy versus dependency are not obvious. E.g. many people are dependent on technologies such as electricity, running water, etc.

The book gives a good summary of many disparate technologies, where they are and where they are going. The width of topics covered is a strength of the book. The brevity of the book, less than 200 pages makes for quick reading, but inevitably means that the book doesn't delve super deep into any single topic.

The analysis is mostly convincing, but at times unconvincing. For example, the author claims that IoT device makers have no incentive to care for security, because there is little regulation and no fines for errors. As an example, the author discusses the connected toy maker VTech whose dolls' security were compromised. One would think that market discipline and reputation goes a long way towards incentivizing manufacturers to care about security, even without the visible hand of government.

Overall, the book is highly topical, and even though this was not a superb reading experience, it functions as

a good primer on a number of technologies, and their social implications. For a more business strategy oriented look at many of the same technologies, the recent "Machine, Platform, Crowd" by Andrew McAfee and Erik Brynjolfsson appears to be a promising book.

As for whether we are heading for Star Trek or Mad Max, the author is optimistic. He sees a lot of potential in a future of nearly free energy and water (and hence abundant supply of food) due to improvements in solar energy, as well as autonomous cars, which will be the biggest bursts to autonomy that humans have enjoyed in history.

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### **?? ? says**

This is a book about current technologies up till late 2016 and what could happen in the near future. The good part, it is easy to read, and conveyed quite some tech update (for those who didn't follow the news). Beside that, structure for this book is clear. The first part discussed the importance of 3 core questions, namely equality, risks and autonomy. And each following chapter in part 2 to 4 summarizes one particular field, and tries to answer those questions.

It is pretty impressive that the author managed to cover 11 different fields in around 150 pages. However, that also means each chapter could only have some general idea about recent development and possible future outlook. For example, the author spent 6 pages (1/3 of a chapter), writing about his imaginary future about education. And the rest of this chapter is a bit history, some previous attempts, a bit what people are currently trying, and of course a bit discussion on equality. So, if you are looking for some more insight of those topics, unfortunately, the author basically stopped after showing you the good, the bad (sometimes) and the potential ugly (in discussion). And you would have to follow his words and look/search elsewhere. Nevertheless, given this book is written to raise the awareness of readers. I think the author has already done a good job by picturing bright future and the scary ones. Star trek vs. Mad max is a good analogy.

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### **Julian says**

Well thought through and written. A provoking read that takes a balanced view on various new technologies that are coming fast and/ or partially here. Each is tested to determine whether it will be part of a "Star Trek" or "Mad Max" scenario as the future is formed.

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