Also by Jaron Lanier

You Are Not a Gadget: A Manifesto

Who Owns the Future?

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Motivation

The Problem in Brief

We're used to treating information as "free,"* but the price we pay for the illusion of "free" is only workable so long as most of the overall economy *isn't* about information. Today, we can still think of information as the intangible enabler of communications, media, and software. But as technology advances in this century, our present intuition about the nature of information will be remembered as narrow and shortsighted. We can think of information narrowly only because sectors like manufacturing, energy, health care, and transportation aren't yet particularly automated or 'net-centric.

But eventually most productivity probably *will* become software-mediated. Software could be the final industrial revolution. It might subsume all the revolutions to come. This could start to happen, for instance, once cars and trucks are driven by software instead of human drivers, 3D printers magically turn out what had once been manufactured goods, automated heavy equipment finds and mines natural resources, and robot nurses handle the material aspects of caring for the elderly. (These and other examples will be explored in detail later on.) Maybe digital technology won't advance enough in this century to dominate the economy, but it probably will.

Maybe technology will then make all the needs of life so inexpensive that it will be virtually free to live well, and no one will

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*As exemplified by free consumer Internet services, or the way financial services firms can often gather and use data without having to pay for it.

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worry about money, jobs, wealth disparities, or planning for old age. I strongly doubt that neat picture would unfold.

Instead, if we go on as we are, we will probably enter into a period of hyper-unemployment, and the attendant political and social chaos. The outcome of chaos is unpredictable, and we shouldn't rely on it to design our future.

The wise course is to consider in advance how we can live in the long term with a high degree of automation.

Put Up or Shut Up

For years I have presented complaints about the way digital technology interfaces with people. I love the technology and doubly love the people; it's the connection that's out of whack. Naturally, I am often asked, "What would you do instead?" If the question is framed on a personal level, such as "Should I quit Facebook?" the answer is easy. You have to decide for yourself. I am not trying to be anyone's guru.*

On the level of economics, though, I ought to provide an answer. People are not just pointlessly diluting themselves on cultural, intellectual, and spiritual levels by fawning over digital superhuman phenomena that don't necessarily exist. There is also a material cost.

People are gradually making themselves poorer than they need to be. We're setting up a situation where better technology in the long term just means more unemployment, or an eventual socialist backlash. Instead, we should seek a future where more people will do well, without losing liberty, even as technology gets much, much better.

Popular digital designs do not treat people as being "special enough." People are treated as small elements in a bigger information machine, when in fact people are the *only* sources or destinations of information, or indeed of any meaning to the machine at all. My goal is to portray an alternate future in which people are treated appropriately as being special.

*... though I'll make a suggestion at the end of the book.

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How? Pay people for information gleaned from them if that information turns out to be valuable. If observation of you yields data that makes it easier for a robot to seem like a natural conversationalist, or for a political campaign to target voters with its message, then you ought to be owed money for the use of that valuable data. It wouldn't exist without you, after all. This is such a simple starting point that I find it credible, and I hope to persuade you about that as well.

The idea that mankind's information should be made free is idealistic, and understandably popular, but information wouldn't need to be free if no one were impoverished. As software and networks become more and more important, we can either be moving toward free information in the midst of insecurity for almost everyone, or toward paid information with a stronger middle class than ever before. The former might seem more ideal in the abstract, but the latter is the more realistic path to lasting democracy and dignity.

An amazing number of people offer an amazing amount of value over networks. But the lion's share of wealth now flows to those who aggregate and route those offerings, rather than those who provide the "raw materials." A new kind of middle class, and a more genuine, growing information economy, could come about if we could break out of the "free information" idea and into a universal micropayment system. We might even be able to strengthen individual liberty and self-determination even when the machines get very good.

This is a book about futuristic economics, but it's really about how we can remain human beings as our machines become so sophisticated that we can perceive them as autonomous. It is a work of nonnarrative science fiction, or what could be called speculative advocacy. I'll argue that the particular way we're reorganizing our world around digital networks is not sustainable, and that there is at least one alternative that is more likely to be sustainable.

Moore's Law Changes the Way People Are Valued

The primary influence on the way technologists have come to think about the future since the turn of the century is their direct expe-

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rience of digital networks through consumer electronics. It only takes a few years, not a lifetime, for a young person to experience Moore's Law–like changes.

Moore's Law is Silicon Valley's guiding principle, like all ten commandments wrapped into one. The law states that chips get better at an accelerating rate. They don't just accumulate improvements, in the way that a pile of rocks gets higher when you add more rocks. Instead of being added, the improvements *multiply*. The technology seems to always get twice as good every two years or so. That means after forty years of improvements, microprocessors have become *millions* of times better. No one knows how long this can continue. We don't agree on exactly why Moore's Law or other similar patterns exist. Is it a human-driven, self-fulfilling prophecy or an intrinsic, inevitable quality of technology? Whatever is going on, the exhilaration of accelerating change leads to a religious emotion in some of the most influential tech circles. It provides a meaning and context.

Moore's Law means that more and more things can be done practically for free, if only it weren't for those people who want to be paid. People are the flies in Moore's Law's ointment. When machines get incredibly cheap to run, people seem correspondingly expensive. It used to be that printing presses were expensive, so paying newspaper reporters seemed like a natural expense to fill the pages. When the news became free, that anyone would want to be paid at all started to seem unreasonable. Moore's Law can make salaries—and social safety nets—seem like unjustifiable luxuries.

But our immediate experience of Moore's Law has been cheap treats. Yesterday's unattainably expensive camera becomes just one of today's throwaway features on a phone. As information technology becomes millions of times more powerful, any particular use of it becomes correspondingly cheaper. Thus, it has become commonplace to expect online services (not just news, but 21st century treats like search or social networking) to be given for free, or rather, in exchange for acquiescence to being spied on.

Essential but Worthless

As you read this, thousands of remote computers are refining secret models of who you are. What is so interesting about you that you're worth spying on?

The cloud is driven by statistics, and even in the worst individual cases of personal ignorance, dullness, idleness, or irrelevance, every person is constantly feeding data into the cloud these days. The value of such information could be treated as genuine, but it is not. Instead, the blindness of our standards of accounting to all that value is gradually breaking capitalism.

There is no long-term difference between an ordinary person and a skilled person in this scheme. For now, many kinds of skilled people do well in a software-mediated world, but if things don't change, those who own the top machines will gradually emerge as the only elite left standing. To explain why, consider how advancing technology could do to surgery what it has already done to recorded music.

Musical recording was a mechanical process until it wasn't, and became a network service. At one time, a factory stamped out musical discs and trucks delivered them to retail stores where salespeople sold them. While that system has not been entirely destroyed, it is certainly more common to simply receive music instantly over a network. There used to be a substantial middle-class population supported by the recording industry, but no more. The principal beneficiaries of the digital music business are the operators of network services that mostly give away the music in exchange for gathering data to improve those dossiers and software models of each person.

The same thing could happen to surgery. Nanorobots, holographic radiation, or just plain old robots using endoscopes might someday perform heart surgery. These gadgets would perform the economic role that MP3 players and smartphones took on in music delivery. Whatever the details, surgery would then be reconceived as an information service. The role of human surgeons in that case is not predetermined, however. They will remain *essential*, for the technology will rely on data that has to come from people, but it isn't decided yet if they'll be *valued* in terms that lead to wealth.

Nonspecialist doctors have already lost a degree of self-determination because they didn't seize the centers of the networks that have arisen to mediate medicine. Insurance and pharmaceutical concerns, hospital chains, and various other savvy network climbers were paying better attention. No one, not even a heart surgeon, should pretend to be indefinitely immune to this pattern.

There will always be humans, lots of them, who provide the data that makes the networked realization of any technology better and cheaper. This book will propose an alternative, sustainable system that will continue to honor and reward those humans, no matter how advanced technology becomes. If we continue on the present path, benefits will instead flow mostly to the tenders of the top computers that route data about surgery, essentially by spying on doctors and patients.

The Beach at the Edge of Moore's Law

A heavenly idea comes up a lot in what might be called Silicon Valley metaphysics. We anticipate immortality through mechanization. A common claim in utopian technology culture is that people—well, perhaps not everyone—will be uploaded into cloud computing servers* later in this century, perhaps in a decade or two, to become immortal in Virtual Reality. Or, if we are to remain physical, we will be surrounded by a world animated with robotic technology. We will float from joy to joy, even the poorest among us living like a sybaritic magician. We will not have to call forth what we wish from the world, for we will be so well modeled by statistics in the computing clouds that the dust will know what we want.

Picture this: It's sometime later in the 21st century, and you're at the beach. A neuro-interfaced seagull perches and seems to speak, telling you that you might want to know that nanobots are repairing

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*A "server" is just a computer on a network that serves up responses to other computers. Generally home computers or portable devices aren't set up to acknowledge connections from arbitrary other computers, so they aren't servers. A "cloud" is a collection of servers that act in a coordinated way.

your heart valve at the moment (who knew you had a looming heart problem?) and the sponsor is the casino up the road, which paid for this avian message *and* the automatic cardiology through Google or whatever company is running that sort of switchboard decades hence.

If the wind starts to blow, swarms of leaves turn out to be subtle bioengineered robots that harness that very wind to propel themselves into an emergent shelter that surrounds you. Your wants and needs are automatically analyzed and a robotic masseuse forms out of the sand and delivers shiatsu as you contemplate the wind's whispers from your pop-up cocoon.

There are endless variations of this sort of tale of soon-to-appear high-tech abundance. Some of them are found in science fiction, but more often these visions come up in ordinary conversations. They are so ambient in Silicon Valley culture that they become part of the atmosphere of the place. Typically, you might hear a thought experiment about how cheap computing will be, how much more advanced materials science will become, and so on, and from there your interlocutor extrapolates that supernatural-seeming possibilities will reliably open up later in this century.

This is the thought schema of a thousand inspirational talks, and the motivation behind a great many startups, courses, and careers. The key terms associated with this sensibility are *accelerating change, abundance,* and *singularity.*

The Price of Heaven

My tale of a talking seagull strikes me as being kitschy and contrived, but any scenario in which humans imagine living without constraints feels like that.

But we needn't fear a loss of constraints. Utopians presume the advent of abundance not because it will be affordable, but because it will be free, provided we accept surveillance.

Starting back in the early 1980s, an initially tiny stratum of gifted technologists conceived new interpretations of concepts like privacy, liberty, and power. I was an early participant in the process and helped to formulate many of the ideas I am criticizing in this book.

What was once a tiny subculture has blossomed into the dominant interpretation of computation and software-mediated society.

One strain of what might be called "hacker culture" held that liberty means absolute privacy through the use of cryptography. I remember the thrill of using military-grade stealth just to argue about who should pay for a pizza at MIT in 1983 or so.

On the other hand, some of my friends from that era, who consumed that pizza, eventually became very rich building giant cross-referenced dossiers on masses of people, which were put to use by financiers, advertisers, insurers, or other concerns nurturing fantasies of operating the world by remote control.

It is typical of human nature to ignore hypocrisy. The greater a hypocrisy, the more invisible it typically becomes, but we technical folk are inclined to seek an airtight whole of ideas. Here is one such synthesis—of cryptography for techies and massive spying on others—which I continue to hear fairly often: Privacy for ordinary people can be forfeited in the near term because it will become moot anyway.

Surveillance by the technical few on the less technical many can be tolerated for now because of hopes for an endgame in which everything will become transparent to everyone. Network entrepreneurs and cyber-activists alike seem to imagine that today's elite network servers in positions of information supremacy will eventually become eternally benign, or just dissolve.

In the telling of digital utopias, when computing gets ultragood and ultracheap we won't have to worry about the reach of elite network players descended from today's derivatives funds, or Silicon Valley companies like Google or Facebook. In a future world of abundance, everyone will be motivated to be open and generous.

Bizarrely, the endgame utopias of even the most ardent high-tech libertarians always seem to take socialist turns. The joys of life will be too cheap to meter, we imagine. So abundance will go ambient.

This is what diverse cyber-enlightened business concerns and political groups all share in common, from Facebook to WikiLeaks. Eventually, they imagine, there will be no more secrets, no more barriers to access; all the world will be opened up as if the planet were transformed into a crystal ball. In the meantime, those true

believers encrypt their servers even as they seek to gather the rest of the world's information and find the best way to leverage it.

It is all too easy to forget that "free" inevitably means that someone else will be deciding how you live.

The Problem Is Not the Technology, but the Way We Think About the Technology

I will argue that up until about the turn of this century we didn't need to worry about technological advancement devaluing people, because new technologies always created new kinds of jobs even as old ones were destroyed. But the dominant principle of the new economy, the information economy, has lately been to conceal the value of information, of all things.

We've decided not to pay most people for performing the new roles that are valuable in relation to the latest technologies. Ordinary people "share," while elite network presences generate unprecedented fortunes.

Whether these elite new presences are consumer-facing services like Google, or more hidden operations like high-frequency-trading firms, is mostly a matter of semantics. In either case, the biggest and best-connected computers provide the settings in which information turns into money. Meanwhile, trinkets tossed into the crowd spread illusions and false hopes that the emerging information economy is benefiting the majority of those who provide the information that drives it.

If information age accounting were complete and honest, as much information as possible would be valued in economic terms. If, however, "raw" information, or information that hasn't yet been routed by those who run the most central computers, isn't valued, then a massive disenfranchisement will take place. As the information economy arises, the old specter of a thousand science fiction tales and Marxist nightmares will be brought back from the dead and empowered to apocalyptic proportions. Ordinary people will be unvalued by the new economy, while those closest to the top computers will become hypervaluable.

Making information free is survivable so long·as only limited numbers of people are disenfranchised. As much as it pains me to say so, we can survive if we only destroy the middle classes of musicians, journalists, and photographers. What is not·survivable is the additional destruction of the middle classes in transportation, manufacturing, energy, office work, education, and health care. And all that destruction will come surely enough if the dominant idea of an information economy isn't improved.

Digital technologists are setting down the new grooves of how people live, how we do business, how we do everything—and they're doing it according to the expectations of· foolish utopian scenarios. We want free online experiences so badly that we are happy to not be paid for information that comes from us now or ever. That sensibility also implies that the more dominant information becomes in our economy, the less most of us will be worth.

Saving the Winners from Themselves

Is the present trend really a benefit for those who run the top servers that have come to organize the world? In the short term, of course, yes. The greatest fortunes in history· have been created recently by using network technology as a way to concentrate information and therefore wealth and power.

However, in the long term, this way of using network technology is not even good for the richest and most powerful players, because their ultimate source of wealth can only be a growing economy. Pretending that data came from the heavens instead of from people can't help but eventually shrink the overall economy.

The more advanced technology becomes, the more all activity becomes mediated by information tools. Therefore, as our economy turns more fully into an information economy, it will only grow if more ·information is monetized, instead of less. That's not what we're doing.

Even the most successful players of the game are gradually undermining the core of their own wealth. Capitalism only works if there are enough successful people to be the customers. A market

system can only be sustainable when the accounting is thorough enough to reflect where value comes from, which, I'll demonstrate, is another way of saying that an information age middle class must come into being.

Progress Is Compulsory

Two great trends are colliding, one in our favor, and the other against us. Balancing our heavenly expectations, there are also countervailing fears about such things as global climate change and the problem of finding food and drinking water for the human population when it peaks later in this century. Billions more people than have ever been sustained before will need water and food.

We bring the great problems of our times on ourselves, and yet we have little choice but to do so. The human condition is an evolving technological puzzle. Solving one problem creates new ones. This has always been true and is not a special quality of present times.

The ability to grow a larger population, through reduced infant mortality rates, sets up the conditions for a greater famine. People are cracking the inner codes of biology, creating amazing new chemistries, and amplifying our capabilities with digital networks just as we are also undermining our climate, and critical resources are starting to run out. And yet we are compelled to plunge forward, because history isn't reversible. Besides, we must be honest about how bad things were in lower-tech times.

New technological syntheses that will solve the great challenges of the day are less likely to come from garages than from collaborations by many people over giant computer networks. It is ·the politics and economics of these networks that will determine how new capabilities translate into new benefits for ordinary people.

Progress Is Never Free of Politics

Maybe the coolest technology could get very good and cheap, *while at the same time* crucial fundamentals for survival could become expen-

sive. The calculi of digital utopias and man-made disasters don't contradict each other. They can coexist. This is the heading of the darkest and funniest science fiction, such as the work of Philip K. Dick.

Basics like water and food could soar in cost *even as* intensely sophisticated gadgets, like automated nanorobotic heart surgeons, float about as dust in the air in case they are needed, sponsored by advertisers.

Everything can't become free at once, because the real world is messy. Software and networks are messy. And the sprawling miracle of information-animated technology rests on limited resources.

The illusion that everything is getting so cheap that it is practically free sets up the political and economic conditions for cartels exploiting whatever isn't quite that way. When music is free, wireless bills get expensive, insanely so. You have to look at the whole system. No matter how petty a flaw might be in a utopia, that flaw is where the full fury of power seeking will be focused.

Back to the Beach

You sit at the edge of the ocean, wherever the coast will be after Miami is abandoned to the waves. You are thirsty. Random little clots of dust are full-on robotic interactive devices, since advertising companies long ago released plagues of smart dust upon the world. That means you can always speak and some machine will be listening. "I'm thirsty, I need water."

The seagull responds, "You are not rated as enough of a commercial prospect for any of our sponsors to pay for freshwater for you." You say, "But I have a penny." "Water costs two pennies." "There's an ocean three feet away. Just desalinate some water!" "Desalinization is licensed to water carriers. You need to subscribe. However, you can enjoy free access to any movie ever made, or pornography, or a simulation of a deceased family member for you to interact with as you die from dehydration. Your social networks will be automatically updated with the news of your death." And finally, "Don't you want to play that last penny at the casino that just repaired your heart? You might win big and be able to enjoy it."