

THE
INDUSTRIES
OF THE
FUTURE



ALEC
ROSS

LEADING INNOVATION EXPERT ALEC ROSS explains what's next for the world: the advances and stumbling blocks that will emerge in the next ten years, and how we can navigate them. While Alec Ross was working as Senior Advisor for Innovation to the Secretary of State, he traveled to 41 countries, exploring the latest advances coming out of every continent. From start-up hubs in Kenya to R&D labs in South Korea, Ross has seen what the future holds.

In *The Industries of the Future*, Ross shows us what changes are coming in the next ten years, highlighting the best opportunities for progress and explaining why countries thrive or sputter. He examines the specific fields that will most shape our economic future, including robotics, cybersecurity, the commercialization of genomics, the next step for big data, and the coming impact of digital technology on money and markets.

Ross blends storytelling and economic analysis to present a vivid and informed perspective on how sweeping global trends are affecting the ways we live. Incorporating the insights of leaders ranging from tech moguls to defense experts, *The Industries of the Future* takes the intimidating, complex topics that many of us know to be important and boils them down into clear, plainspoken language. This is an essential book for understanding how the world works—now and tomorrow—and a must-read for businesspeople in every sector, from every country.

“How can we prepare our children—and ourselves—to succeed in a world of robotics, globalization, and digitally driven markets? In this valuable book, Alec Ross analyzes what it will take to survive and even thrive. The future is already hitting us, and Ross shows how it can be exciting rather than frightening.”

—**WALTER ISAACSON**, author
of *Steve Jobs* and *The Innovators*

“In a world growing more chaotic, Alec Ross is one of those very rare people who can see patterns in the chaos and provide guidance for the road forward. He has an unusual diversity of expertise that allows him to apply multiple lenses to the world's challenges and dream up the kind of innovative solutions that are changing the world.”

—**ERIC SCHMIDT**,
Executive Chairman, Alphabet



ALEC ROSS is one of America's leading experts on innovation. He served for four years as Senior Advisor for Innovation to the Secretary of State. He is currently a Distinguished Visiting Fellow at Johns Hopkins University and serves as an advisor to investors, corporations, and government leaders. Ross lives in Baltimore with his wife and their three children.



SIMON &
SCHUSTER
PAPERBACKS

MEET THE AUTHORS, WATCH VIDEOS AND MORE AT
SimonandSchuster.com

COVER DESIGN BY JASON HEUER
AUTHOR PHOTO © STEPHEN VOSS

BUSINESS & ECONOMICS

0216

ISBN 978-1-5011-4079-2

\$18.00 U.S.

5 1 8 0 0



9 781501 140792

FOR INTERNATIONAL SALE ONLY

PRINTED IN THE U.S.A.

CONTENTS

INTRODUCTION	1
1. HERE COME THE ROBOTS	15
<i>Welcome your new job takers and caregivers. The coming decade will see societies transform as humans learn to live alongside robots.</i>	
2. THE FUTURE OF THE HUMAN MACHINE	44
<i>The last trillion-dollar industry was built on a code of 1s and 0s. The next will be built on our own genetic code.</i>	
3. THE CODE-IFICATION OF MONEY, MARKETS, AND TRUST	76
<i>Is there an algorithm for trust? New ways to exchange are forcing a rewrite of the compact between corporation, citizen, and government.</i>	
4. THE WEAPONIZATION OF CODE	121
<i>The world has left the Cold War behind only to enter into a Code War.</i>	

5. DATA: THE RAW MATERIAL OF THE INFORMATION AGE	152
<i>Land was the raw material of the agricultural age. Iron was the raw material of the industrial age. Data is the raw material of the information age.</i>	
6. THE GEOGRAPHY OF FUTURE MARKETS	186
<i>World leaders take notice: the 21st century is a terrible time to be a control freak.</i>	
CONCLUSION: THE MOST IMPORTANT JOB YOU WILL EVER HAVE	240
<i>Acknowledgments</i>	251
<i>Notes</i>	253
<i>Index</i>	297

INTRODUCTION

Adapt or perish, now as ever, is nature's inexorable imperative.

—H. G. Wells, *A Short History of the World* (1922)

THE WRONG SIDE OF GLOBALIZATION

It's 3:00 a.m., and I'm mopping up whisky-smelling puke after a country music concert in Charleston, West Virginia.

It's the summer of 1991, just after my freshman year of college. While most of my friends from Northwestern University are off doing fancy internships at law firms, congressional offices, and investment banks in New York or Washington, I am one of six guys on the after-concert janitorial crew at the Charleston Civic Center, which seats 13,000 people.

Working the midnight shift is worse than jet lag. You have to decide if you want your work to be the beginning of your day or the end of your day. I would wake up at 10:00 p.m., eat "breakfast," work from midnight to 8:00 a.m., and then go to bed around 3:00 p.m.

The other five guys on the crew were a tough bunch. They were

good guys but beaten down. One carried a pint bottle of vodka in his back pocket, which was done by “lunch” at 3:00 a.m. A scraggly red-head from the hollows, the valleys that run between West Virginia’s hills, was sort of near my age. The others were in their 40s and 50s, at what should have been the peak of their wage-earning potential.

The way country music concerts work in West Virginia is people drink way too much. Our job was to clean up the result. The six of us canvassed the arena with enormous jugs of fluorescent-blue chemicals, which, when poured on the concrete floor, would just sizzle.

The last wave of innovation and globalization produced winners and losers. One group of winners were the investors, entrepreneurs, and high-skilled laborers that congregated around fast-growing markets and new inventions. Another class of winners were the more than 1 billion people who moved from poverty into the middle class in developing countries because their relatively low-cost labor was an advantage once their countries opened up and became part of a global economy. The losers were people who lived in high-cost labor markets like the United States and Europe whose skills could not keep up with the pace of technological change and globalizing markets. The guys I mopped with on the midnight shift were the losers in large part because the job they could have gotten in a coal mine years before had been replaced by a machine, and whatever job they could have gotten in a factory from the 1940s to the 1980s had moved to Mexico or India. For these men, being a midnight janitor was just not the summer job it was to me; it was one of the only options left.

Growing up, I thought that life in West Virginia was representative of life everywhere. You were doing your best to manage a slow descent. But the phenomenon I was witnessing in West Virginia really made sense to me only as I traveled the world and saw other regions rising as West Virginia was falling.

Twenty years after pushing a mop on the midnight shift, I’ve now seen the world and been exposed to the highest levels of leadership in the biggest technology companies and governments around the world.

ONE

HERE COME THE ROBOTS

Welcome your new job takers and caregivers. The coming decade will see societies transform as humans learn to live alongside robots.

Japan is home to the longest-living citizens on earth and the biggest elderly population of any country—and it's not getting any younger. Japan's current life expectancy is 80 years for men and 87 years for women and is expected to rise to 84 and 91, respectively, over the next 45 years. Between 2010 and 2025, the number of Japanese citizens 65 years or older is expected to increase by 7 million. Today, 25 percent of Japan's population is age 65 or older. By 2020, this is projected to increase to 29 percent and reach 39 percent by 2050.

All of those long-living elderly will need caretakers. Yet Japan's low birthrates mean that what once was a staple of Japanese family life—taking care of one's grandparents and great-grandparents—will no longer be a viable model at the scale the nation needs. There will not be enough grandchildren.

With Japan's persistently strict immigration policies curtailing the

TWO

THE FUTURE OF THE HUMAN MACHINE

*The last trillion-dollar industry was built on a code of 1s
and 0s. The next will be built on our own genetic code.*

Lukas Wartman is the kind of guy you invite to a dinner party to impress your guests. He mixes advice about which Diego Rivera murals to see in Mexico City with accounts of the latest developments in cancer research now taking place inside the world's most advanced life sciences labs. Raised 45 minutes outside Chicago, Wartman speaks with midwestern affability. He's quiet and earnest, with a round face, kind blue eyes, and short brown hair. His Facebook page is filled with photos of him and his dog, Kazu. He's a low-key guy. Even while wearing his white lab coat, the 38-year-old Wartman is reluctant to tout his own expertise or share his remarkable life story.

But Wartman's life *is* remarkable. He works on the cutting edge of genomic technology. From his lab at Washington University in St. Louis, the oncologist and medical researcher studies leukemia in mice, creating comprehensive genomic models of the disease. Even

THREE

THE CODE-IFICATION OF MONEY, MARKETS, AND TRUST

Is there an algorithm for trust? New ways to exchange are forcing a rewrite of the compact between corporation, citizen, and government.

When I was growing up, money was something you put in a wallet. Buying something meant going to a store, talking to a cashier, taking out your wallet, and handing over your bills. I still remember my father's worn, brown leather wallet. Even as a child, I understood its importance. That wallet was how my father would pay for dinner—or for a treat for me. Its size determined the course of each week and each day. When we left for vacation, it would be thick with possibilities. When it grew thin, it was time to head home.

Money has long been primarily a physical entity—something that can be held and weighed. Many of the world's currencies, in their very names, reflect the notion of money as something tangible. The “peso,” the Israeli “shekel,” and the British “pound” all derive from words for weight. “Ruble” comes from the Old Russian *rubiti*—“to chop, cut, hew”—because the original metallic currency came in silver bars,

FOUR

THE WEAPONIZATION OF CODE

*The world has left the Cold War behind
only to enter into a Code War.*

On Wednesday, August 15, 2012, a shadowy group linked to the Iranian government attacked Saudi Aramco, the world's largest energy company. Their weapon of choice: a computer virus.

In an attack that would come to be known as Shamoon and Distrack, after words found within the program's code, hackers developed a virus that a rogue employee delivered by USB drive onto Saudi Aramco's computer network. Like an outbreak of influenza, the virus rapidly spread from computer to computer, moving from "patient zero" to a wide swath of Saudi Aramco's huge corporate network. It infected not just Saudi Aramco's main offices in Saudi Arabia but spread to workstations in several other countries, including the United States and the Netherlands.

Shamoon was designed to wipe out the memory of Saudi Aramco's computer system. Generally when a file is deleted from a computer,

FIVE

DATA: THE RAW MATERIAL OF THE INFORMATION AGE

Land was the raw material of the agricultural age.

Iron was the raw material of the industrial age. Data

is the raw material of the information age.

At the house that I grew up in, the woods ran right up to our back door. Many summer mornings, I would run out the door and into the woods with my buddies. We would play for hours, roaming over a few square miles of forest until we got hungry. Then we'd make our way home to gobble up a lunch of macaroni and cheese and head back out into the woods until dinnertime. Our parents had a general sense of where we were, but they didn't care exactly where. We were unmonitored. We were untrackable. We were unreachable. There were no adults anywhere. Just kids and animals. Our parents knew we'd come home when we got hungry.

That was the normal state of affairs for children of my generation. Suburban kids would hop on their bikes; city kids would hit the playgrounds and the subways. Today every kid has a cell phone, including my 13-year-old son. When today's kids leave the house,

SIX

THE GEOGRAPHY OF FUTURE MARKETS

*World leaders take notice: the 21st century is
a terrible time to be a control freak.*

“We want to create our own Silicon Valley.” If there’s a single sentence I’ve heard in every country I’ve been to, it’s this one.

Silicon Valley has been home to technology-driven innovation for a long time, but the 20-year period from 1994 to 2014 was something special. People all over the world witnessed a spectacular level of innovation and wealth creation, all emerging from a small 30-mile long, 15-mile-wide strip of Northern California.

Other states and countries have been attempting to build the “next Silicon Valley” for years now. At this point, there’s even a formula. As Marc Andreessen writes:

The popular recipe for creating the “next” Silicon Valley goes something like this:

CONCLUSION: THE MOST IMPORTANT JOB YOU WILL EVER HAVE

Robots that care for us as we grow old. Cyberattacks against our homes. Extinct animals brought back to life. Ubiquitous sensors eliminating privacy as we now know it. These changes are disorienting and more than a little scary. As much as I think about the changes I have described in this book from an economic and geopolitical perspective, what really gets popcorn popping in my head is thinking about these changes from my perspective as the father of three children ages 13, 11, and 9.

The most important job I will ever have is being a dad, and I can't help wondering what all these coming changes—the ones that this book anticipates and the ones that it does not—will mean for our children's economic future. My kids will have an entirely different set of opportunities and challenges than I had growing up in West Virginia. What will it take for them to compete and succeed?

I asked just about everyone I interviewed for this book what attributes today's kids will need for tomorrow's economy. There was no consensus—no single, singular conclusion to put in a headline. But there was near-consensus on a thing or two and some common themes that emerged as I talked to more people.

To start, the stories of the two youngest people interviewed for this book give good glimpses into the attributes that today's children will need for tomorrow's economy.

Think back to 24-year-old venture capitalist Sheel Tyle, who set out on his career path after being inspired by Sudanese mobile phone billionaire Mo Ibrahim. Sheel's parents are both from India and came to the United States for higher education. His mother, Tanu (the first in her family to fly on an airplane), was one of 15 women in a class of 1,000 at her college in India, which prompted her to move her studies to the United States. Sheel's father, Praveen, applied to colleges that did not charge an application fee. He went to Ohio State University instead of other universities, including the Ivy League, because Ohio State gave him a full scholarship and he received a free plane ticket to travel there.

As Sheel's parents entered the professional class in America, they decided to take Sheel and his younger brother, Sujay, on trips that would help them understand that they were living lives of relative privilege, contributing to their emotional development and making them more worldly. Sheel says that "when we were growing up, we never took trips to Europe or the Caribbean. Anytime my parents had some free time, they wanted to show us how the real world works."

His parents took them to Brazil and Kenya in the 1990s when both were still considered undeveloped frontier countries. When he was seven years old, Sheel's family traveled to an orphanage for blind children, 80 percent of whom had treatable blindness but could not be treated because of the lack of funds.

His parents were not wealthy, but they spent a big piece of their incomes on these travels to open up their kids' eyes to the wider world. Sheel and his brother were little kids, but they were already imagining

their lives and careers being played out in a global context. That was why Mo Ibrahim's success in bringing mobile telecom to Africa set Sheel on his course as an investor.

In the same way that entrepreneurs, businesses, and investors who engaged in China and India ten to twenty years ago were able to build big businesses, people who can look around the world and see and understand the opportunity in the next wave of high-growth markets are those who will realize the greatest gains. The time Sheel spent in places like Nairobi was seminal for him, and as he invests in the hottest of hotshot early-stage deals in Silicon Valley—in fields including cryptocurrency, clean tech, consumer Internet, and mobile—he's also doing something that only a tiny percentage of Silicon Valley investors are doing: investing in places that are today's frontier markets, like Kenya, Uganda, and Bangladesh. As those markets develop, those like Sheel who are educated about the market will have a head start toward developing the relationships and partnerships to source quality investments. They will get in early, when valuations are at their lowest—where China stood in the 1990s and the Internet stood in 1994.

Sheel imagines himself always working globally, and he thinks of that huge geographic span as home. He says, "I don't aspire to nor do I feel like our circle of friends will truly settle anywhere; we are constantly going between the San Francisco–Boston–New York–DC corridor domestically and then large emerging market cities. Home for me isn't a place but rather a feeling—a feeling best felt when near family or with close friends."

Today Sheel is the youngest venture capitalist with a senior role at a major Silicon Valley venture capital firm. His brother, Sujay, matriculated at Harvard as a 15-year-old and stayed for five semesters before accepting a Thiel Fellowship. The fellowship, set up by PayPal Mafia alum Peter Thiel, gives young college students \$100,000 to drop out of college and focus on entrepreneurship. Sujay moved out west and became the chief operating officer of Hired.com (an online marketplace where companies compete for engineering talent) and a vice

president at a mobile entertainment network. He recently decided to go back to school to finish up an environmental science and public policy degree at Harvard.

Ten years older than Sheel is Jared Cohen, and at just 34, he is still young in my eyes. When I first went to work for Hillary Clinton at the State Department at the beginning of Obama's presidency, I met Jared, then 27 years old. He was one of the few holdovers from the Bush presidency. By the time I met him, he was a Rhodes scholar and had already written two books. Like Sheel, he had gone to Stanford for his undergraduate education. Jared and I worked closely together for a year and a half before he left to work for Google chairman Eric Schmidt and establish Google Ideas. My experience traveling and working with Jared reinforces what I think can be learned from Sheel.

The son of a psychologist and an artist in Connecticut, Jared grew up with a curiosity about foreign languages and cultures. He began teaching himself Swahili from a book when he was 16 years old, a sophomore in high school. His mom then began taking him to private Swahili classes at Yale, and he began traveling to Africa. At 19, he lived with the Masai tribesmen in Kenya.

While Jared and I were together in East Congo and the hills in western Rwanda, it was no small advantage to have a fluent Swahili speaker on the team. We were able to bypass the Abbot-and-Costello-like translation plan the embassy set up, where the locals would speak Swahili to an African translator, who would translate it to French for a local embassy staffer, who would then translate from French to English for me and Jared. Instead we were able to communicate and engage directly with people, from militia members who were being repatriated to Rwanda to victims of sexual violence in the refugee camps in East Congo.

Our ability to develop successful programs in the region took advantage of the fact that we were fluent in both the technology and the local language and culture. It's that same dynamic that allowed Mo Ibrahim, the Sudanese mobile phone billionaire, to build businesses

in frontier markets including the Congo. It's the willingness and ability to immerse yourself in today's frontiers that will create many of tomorrow's big businesses. And it is people like Sheel and Jared who will see the opportunities first and will have the skills and relationships to take advantage of those opportunities. Ironically, in a world growing more virtual, it has never been more important to get as many ink stamps in your passport as possible.

Most people can't afford family travel to frontier markets like Sheel's family or private Swahili lessons at Yale like Jared's, but today's parents have many tools that did not exist as recently as Sheel and Jared's childhoods. Language-learning programs are available online that are nearly as good as what can be gotten from a private tutor. There is no substitute for getting on a plane and traveling to frontier markets to learn about them, but the choices made by Sheel's and Jared's solidly middle-class parents put them on a course to achieve the steep upward economic and social mobility they enjoy today.

If a major lesson learned from Jared and Sheel is that multicultural fluency is increasingly important in a business world that is growing more global, other thinkers and experts I spoke to emphasized a different set of skills—or said that foreign language skills were only part of the equation. Many believe that today's kids must also become fluent in a technical, programming, or scientific language. If big data, genomics, cyber, and robotics are among the high-growth industries of the future, then the people who will make their livings in those industries need to be fluent in the coding languages behind them.

"If I were eighteen right now, I would major in computer science or engineering, and I'd be taking Mandarin," former eBay CEO John Donahoe told me. He used his son as an example of what he believes is the right approach: "My youngest son's a freshman at Dartmouth. He's taken Mandarin for four years and he'll probably major in computer science."

Investor and entrepreneur Chamath Palihapitiya shared with me the approach that he and his wife, Brigitte Lau, also a computer

engineer, bring to parenting their two children: “I think it’s really important that people have at least two other languages: one that is traditionally classically linguistic and one that’s technical. And the reason is because the way the human capital markets are changing, you need to have this solidity to be able to converse with people in different parts of the world, understand their cultures, understand their languages, as well as being able to converse technically. My approach in our family is my kids need to learn two languages; one is Spanish—they’ve learned it from day one—and the second will be like Python or some other technical language, which they’ll learn when they’re six and older. That’s the one important thing that we’ve decided, that languages are going to be a really important way to facilitate an understanding of the world, both the physical world in which we live as well as the technical world in which we live.”

The importance of learning technical languages comes up again and again. Charlie Songhurst provided an interesting counternarrative. He sees today’s need for highly technical and mathematical skills as a short-term phenomenon. “There’s a demand curve for certain skill sets at a given time,” he says. “At the moment there’s a demand for aspergy-math minds. But I think we’ve only got ten more years of the Asperger’s economy, because once the tech platforms are established, they won’t reinvent.”

In contrast, Jack Dorsey makes the case that the benefits of programming language fluency go well beyond coding: “I don’t think you do it to become an engineer or to become a programmer; you do it because it teaches you how to think in a very, very different way. It teaches you about abstraction around breaking problems into small parts and then solving them, around systems and how systems interconnect. So these are all tools you will use everywhere, especially as you think about building a business, or running a business, or even working in a business. If you can synthesize a massive, complex system into something that is essential that you can articulate in a very crisp way, that’s exactly what programming teaches you.”

Google's Eric Schmidt reinforces Jack's point about the importance of learning how to understand complex problems. When I asked Eric what skills he thought my kids would most need, he told me that "the biggest issue is simply the development of analytical skills. Most of the routine things people do will be done by computer, but people will manage the computers around them and the analytical skills will never go out of style."

For this reason, many of the people I spoke to encouraged the aged liberal arts education and its credo of "learning how to think." Indeed, many felt that the distance between traditional liberal arts fields and engineering fields would begin to collapse. Jared Cohen asks, "Why should I have to be a political scientist or a computer scientist? Why is there not a hybrid between the two? Why is it that I have to be either a historian or an English major or an electrical engineer? Why is there no hybrid between the two? You know they are both languages. The point is there needs to be a more interdisciplinary approach that merges the sciences and the humanities in a way that prepares kids for a world where those silos are already beginning to be broken down."

Jared is making the point that today's parents should raise their children in the way that Sheel and Sujay Tyle's parents raised them, sending them off to university studies in human biology and public policy for Sheel and environmental science and public policy for Sujay.

Estonia's president Toomas Ilves makes a similar point, suggesting that domains previously occupied *only* by people with backgrounds in the liberal arts, like government, will become increasingly occupied by people with more background knowledge in science and technology. He points to the example of his technology-savvy son, Luukas, who works in government: "He's never going to invent a billion-dollar app, but he's in policy, and he understands the policy implications, and that is, I think, one of our problems right now: we don't have, in Europe at least, people at the policymaking level who understand what IT is about."

But what about the many children born around the world who will not have access to college? There are several resources that have arisen lately that democratize access to important programming skills. One is Codecademy, a Y Combinator project cofounded by two 23-year-olds that teaches people how to code for free online. Codecademy counts more than 24 million people around the globe who have used its resources. A second incredible resource is Scratch, a project of the Lifelong Kindergarten Group at the MIT Media Lab. It's a nonprofit endeavor that teaches programming. It is free and doesn't require a download. It is well-suited to low-bandwidth environments and available in more than 40 languages. To date, more than 5 million projects have been developed on Scratch in more than 150 countries, so it is just about everywhere.

Today's youth who will enter tomorrow's workforce will need to be more nimble and more familiar with the broader workings of the world to be able to find a niche that they can fit into. With robotics automating labor that is cognitive and nonmanual, the kind of job that my father made a 50-year-long career of—practicing real estate law—would be a bad bet for someone exiting law school today. Tomorrow's labor market will be increasingly characterized by competition between humans and robots. In tomorrow's workplace, either the human is telling the robot what to do or the robot is telling the human what to do.

Children growing up in environments of economic and social privilege will always have an advantage over those growing up under lesser circumstances. Much of that privilege has been determined over the years by geography. Throughout the 20th century, the single greatest economic advantage one could have was to be born in the United States or Europe. That relative economic benefit—the spread between the United States or Europe and the rest of the world—has decreased over the last 20 years. As what were previously frontier markets like

China, India, Indonesia, and Brazil became fast-developing markets, there was substantial growth of those countries' middle classes and their elites. In addition to the billion people who entered their middle classes, there are now more than 200 billionaires in China, 90 in India, 50 in Brazil, and 20 in Indonesia.

Living in a fast-growing market provides a rare opportunity to achieve upward economic mobility. And just as China, India, Brazil, and Indonesia were among the past beneficiaries of this growth, we can now say that there has never been a better time to be born in sub-Saharan Africa, where once poor, isolated communities are increasingly part of the global economy and the source of what will be much of the next decade's growth. As more resources like Codecademy and Scratch spread without geographic constraint and as more companies like Andela invest in today's frontier markets, the world will have more fast-developing economies. Best positioned to succeed will be the countries that open up economically, politically, and culturally.

The growing economic diversity and increasing pace of change means that investors and people in global business will have to be as mobile and able to work across cultures as people newly entering the workforce. The same advice that applies to the next generation applies to today's investors if they want to be a part of the trillions of dollars of wealth creation that will come from the industries of the future. The innovation and company creation that is just now beginning to take place in robotics, genomics, cyber, big data, and new fields made possible by the code-ification of money, markets, and trust will spring from alpha cities around the world, but they will also come from places that most business leaders have never visited, like Estonia.

The rise of the Internet economy has taught business leaders that very young people who grew up digital are likely the ones who are going to create the big Internet companies. The same will hold true in many of the industries of the future. I expect most of the billion-dollar businesses in cyber and big data to spring from the minds of people

in their twenties and thirties—those who grew up programming in a time of code war and the exponential growth of data.

I often think back to the midnight shift on the janitorial crew. For many people I met on that job, their entire professional lifetimes would be spent pouring chemicals on the floor after a country music concert, even as they were capable of much more—if they'd simply had an option for career growth or the chance to go back to school.

There is no shame in these jobs, but there is great shame for society and its leaders when a life is made less than what it could be because of a lack of opportunity. The obligation of those in positions of power and privilege is to shape our policies to extend the opportunities that will come with the industries of the future to as many people as possible.

For most of the world's 7.2 billion people, innovation and globalization have created opportunity the likes of which has never before existed. The number of people who have recently moved out of poverty in China alone is equal to double the population of the entire United States. The number of people living in severe poverty and able to concern themselves only with meeting the basic needs of food, shelter, and clothing has decreased at a rate previously unknown in human history.

These changes mean new opportunities for all of us—for businesses, governments, investors, parents, students, and children. This book, I hope, will help us to make the most of them.