

What Will Future Jobs Look Like?

Part 1

The writer **George Eliot**¹ cautioned us that, among all forms of mistake, prophecy is the most gratuitous. The person that we would all acknowledge as her 20th-century counterpart, **Yogi Berra**², agreed. He said, “It’s tough to make predictions, especially about the future.”

I’m going to ignore their cautions and make one very specific forecast. In the world that we are creating very quickly, we’re going to see more and more things that look like science fiction, and fewer and fewer things that look like jobs. Our cars are very quickly going to start driving themselves, which means we’re going to need fewer truck drivers. We’re going to hook Siri up to Watson and use that to automate a lot of the work that’s currently done by customer service reps and troubleshooters and diagnosers, and we’re already taking **R2D2**³, painting him orange, and putting him to work carrying shelves around warehouses, which means we need a lot fewer people to be walking up and down those aisles.

Now, for about 200 years, people have been saying exactly what I’m telling you—the age of technological unemployment is at hand—starting with the Luddites smashing looms in Britain just about two centuries ago, and they have been wrong. Our economies in the developed world have **coasted along**⁴ on something pretty close to full employment.

Which brings up a critical question: Why is this time different, if it really is? The reason it’s different is that, just in the past few years, our machines have started demonstrating skills they have never, ever had before: understanding, speaking, hearing, seeing, answering, writing, and they’re still acquiring new skills. For example, mobile humanoid robots are still incredibly primitive, but the **research arm**⁵ of the Defense Department

just launched a competition to have them do things like this, and if the track record is any guide, this competition is going to be successful. So when I look around, I think the day is not too far off at all when we’re going to have androids doing a lot of the work that we are doing right now. And we’re creating a world where there is going to be more and more technology and fewer and fewer jobs. It’s a world that **Erik Brynjolfsson**⁶ and I are calling “the new machine age.” The thing to keep in mind is that this is absolutely great news.

Part 2

[. . .] We are seeing an amazing flourishing taking place. In a world where it is just about as easy to generate an object as it is to print a document, we have amazing new possibilities.

The people who used to be craftsmen and hobbyists are now makers, and they’re responsible for massive amounts of innovation. And artists who were formerly constrained can now do things that were never, ever possible for them before. So this is a time of great flourishing, and the more I look around, the more convinced I become that this quote, from the physicist Freeman Dyson, is not **hyperbole**⁷ at all. This is just a plain statement of the facts. We are in the middle of an astonishing period.

“Technology is a gift of God. After the gift of life it is perhaps the greatest of God’s gifts. It is the mother of civilizations, of arts and of sciences.” — Freeman Dyson

Which brings up another great question: What could possibly go wrong in this new machine age, right?

[. . .]

¹ George Eliot was an English writer in the 1800s. Eliot wrote under a pen name. Her real name was Mary Ann Evans.

² Yogi Berra is a popular American sports figure who played catcher, as well as worked as coach and manager, for the New York Yankees baseball team.

³ “R2D2” refers to a robot character that appears in the Star Wars movie series.

⁴ Something that “coasts along” continues at a steady speed.

⁵ The noun “arm” can be used to describe a division in a company or organization.

⁶ Erik Brynjolfsson is a professor of Internet Technology Productivity at MIT.

⁷ The noun “hyperbole” is used to describe a statement that is exaggerated.

Part 3

To tell you the kinds of societal challenges that are going to come up in the new machine age, I want to tell a story about two stereotypical American workers. And to make them really stereotypical, let's make them both white guys. And the first one is a college-educated professional, creative type, manager, engineer, doctor, lawyer, that kind of worker. We're going to call him "Ted." He's at the top of the American middle class. His counterpart is not college-educated and works as a laborer, works as a clerk, does low-level **white collar**⁸ or **blue collar**⁹ work in the economy. We're going to call that guy "Bill."

And if you go back about 50 years, Bill and Ted were leading remarkably similar lives. For example, in 1960 they were both very likely to have full-time jobs, working at least 40 hours a week. But as the social researcher **Charles Murray**¹⁰ has documented, as we started to automate the economy, and 1960 is just about when computers started to be used by businesses, as we started to progressively inject technology and automation and digital stuff into the economy, the fortunes of Bill and Ted diverged a lot. Over this time frame, Ted has continued to hold a full-time job. Bill hasn't. In many cases, Bill has left the economy entirely, and Ted very rarely has. Over time, Ted's marriage has stayed quite happy. Bill's hasn't. And Ted's kids have grown up in a two-parent home, while Bill's absolutely have not over time. Other ways that Bill is dropping out of society? He's decreased his voting in presidential elections, and he's started to go to prison a lot more often. So I cannot tell a happy story about these social trends, and they don't show any signs of reversing themselves. They're also true no matter which ethnic group or demographic group we look at, and they're actually getting so severe that they're in danger of overwhelming even the amazing progress we made with the Civil Rights Movement.

And what my friends in Silicon Valley and Cambridge are overlooking is that they're Ted. They're living these amazingly busy, productive lives, and they've got all the benefits to show from that, while Bill is leading a very different life. They're actually both proof of how right Voltaire was when he talked about the benefits of work, and the fact that it saves us from not one but three great evils. "*Work saves a man from three great evils: boredom, vice, and need.*" — Voltaire

Part 4

[W]ith these challenges, what do we do about them?

The **economic playbook**¹¹ is surprisingly clear, surprisingly straightforward, in the short term especially. The robots are not going to take all of our jobs in the next year or two, so the classic **Econ 101**¹² playbook is going to work just fine: Encourage entrepreneurship, **double down**¹³ on infrastructure, and make sure we're turning out people from our educational system with the appropriate skills.

But over the longer term, if we are moving into an economy that's heavy on technology and light on labor, and we are, then we have to consider some more radical interventions, for example, something like a guaranteed minimum income. [. . .] And if you find yourself worried that something like a guaranteed income is going to stifle our drive to succeed and make us kind of complacent, you might be interested to know that social mobility, one of the things we really pride ourselves on in the United States, is now lower than it is in the northern European countries that have these very generous **social safety nets**¹⁴. So the economic playbook is actually pretty straightforward.

The societal one is a lot more challenging. I don't know what the playbook is for getting Bill to engage and stay engaged throughout life.

⁸ "Low-level white collar" work refers to jobs in offices that require a low skill level, such as photocopying.

⁹ "Blue collar" work refers to manual, physical labor.

¹⁰ Charles Murray has written extensively on social policy in the U.S.

¹¹ A "playbook" refers to a book with tactics and strategies written in it, usually used for sports. McAfee uses the term as a synonym for "strategy."

¹² "Econ 101" refers to the basic economics class that all college and university students take to learn the fundamentals of economics.

¹³ The term "double down" is a gambling term used when doubling a bet. McAfee is saying we have to invest much more in infrastructure.

¹⁴ A "social safety net" refers to public programs in place that help people in difficult financial situations.

I do know that education is a huge part of it. I witnessed this firsthand. I was a Montessori kid for the first few years of my education, and what that education taught me is that the world is an interesting place and my job is to go explore it. The school stopped in third grade, so then I entered the public school system, and it felt like I had been sent to the **Gulag**¹⁵. With the benefit of hindsight, I now know the job was to prepare me for life as a clerk or a laborer, but at the time it felt like the job was to kind of bore me into some submission with what was going on around me. We have to do better than this. We cannot keep turning out Bills.

[. . .] I started my talk with quotes from wordsmiths who were separated by an ocean and a century. Let me end it with words from politicians who were similarly distant.

Winston Churchill came to my home of MIT in 1949, and he said, "If we are to bring the broad masses of the people in every

land to the table of abundance, it can only be by the tireless improvement of all of our means of technical production."

Abraham Lincoln realized there was one other ingredient. He said, "I am a firm believer in the people. If given the truth, they can be depended upon to meet any national crisis. The great point is to give them the plain facts."

So the optimistic note, great point that I want to leave you with is that the plain facts of the machine age are becoming clear, and I have every confidence that we're going to use them to chart a good course into the challenging, abundant economy that we're creating.

Thank you very much.

*This is an edited version of McAfee's 2013 TED Talk.
To watch the full talk, visit TED.com.*

¹⁵ Someone who is "sent to the Gulag" is put in a prison-like environment. Gulags were forced labor camps in Stalin era Russia.