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# Automation, jobs, and the future of work

A group of economists, tech entrepreneurs, and academics discuss whether technological advances will automate tasks more quickly than the United States can create jobs.

**The topic of job displacement** has, throughout US history, ignited frustration over technological advances and their tendency to make traditional jobs obsolete; artisans protested textile mills in the early 19th century, for example. In recent years, start-ups and the high-tech industry have become the focus of this discussion. A recent Pew Research Center study found that technology experts are almost evenly split on whether robots and artificial intelligence will displace a significant number of jobs over the next decade, so there is plenty of room for debate.

What follows is an edited transcript of a conversation on this topic, moderated by McKinsey Global Institute partner Michael Chui and MGI director James Manyika. The participants were Martin Baily, senior fellow, economic studies, Brookings Institution; Richard Cooper, Maurits C. Boas Professor of International Economics, Harvard University; Curtis Carlson, former president and CEO, SRI International; Reid Hoffman, partner, Greylock; Tim O'Reilly, founder and CEO, O'Reilly Media; Matt Slaughter, associate dean of faculty, Tuck School of Business; Laura Tyson, professor of business administration and economics, Haas Business and Public Policy Group, University of California, Berkeley; and Vivek Wadhwa, fellow, Arthur & Toni Rembe Rock Center for Corporate Governance, Stanford University.

## Rethinking job creation

**Tim O'Reilly:** There's this wonderful line from William Gibson, the science-fiction writer. He said, "The future is here, it's just not evenly distributed yet." So, yes, there's all kinds of science-fiction things that we can imagine in the future. But we can also just look around and see what is happening today and then extrapolate forward.

**Reid Hoffman:** If you look at most of the automation, it comes down to man–machine combinations. And all productivity means is that when you have productivity increases, each person is doing more. And therefore, the unit—the number of people to do this amount of work—goes down, right? But that then creates resources for doing other work. The most simple one was the transformation from an agricultural economy. We used to have a huge percentage—

**James Manyika:** Forty-one percent of employment, right?

**Reid Hoffman:** Yes, was making food. And now it's under 2 percent. What happens with that 40 percent of the population? Well, they go on to other jobs. Now, the reason this topic is urgent is whether exponentiating Moore's law changes the rule or not. There's always painful dislocation. Can we make that pain a lot less? Can we make the time cycle shorter?

I want to share one of the things I learned from a recent trip to Shenzhen, because it's one of the most interesting manufacturing hubs. We went to Huawei. I was expecting, as a Silicon Valley technologist, that it would be a complete line of robots. The whole thing would be automated because that would obviously be the thing to do.

Roughly 60 percent of it was automated and 40 percent of it was still people. And it's all a question of choice. You say, "is that just because of low cost?" No, no. These are actually high-pay, high-skill jobs. The answer is actually that, in the future, adaptability is key, and people are more adaptable. So when they set up the machine line and it's all machines, there is a huge amount of retooling to shift from line one to line two, whereas the people are much more easy to shift.

**Tim O'Reilly:** If you look at this idea that it's a combination of man and machine, and you look at some of the examples that have really kind of surprised us in just how they've taken off—like Uber, like the Apple store—they are actually cases where humans are made more powerful by this background. And that creates a better customer experience, which creates new demand.

Ultimately, we are going to be focused on making better experiences for consumers, and that will not necessarily be automatable. When we say we want to create jobs, that takes away agency. It's this notion that "I will hire you, and you will work for the man." That whole cultural ideal is an artifact. It's not written in stone.

**Reid Hoffman:** I think the optimistic scenario is, as Tim was describing, that we have not only a creation of new industries and new jobs, which are essentially a kind of full-time salary work, but also the creation of a lot of different economic opportunities where people can be microentrepreneurs—they can do all sorts of things. And that we can facilitate because we're in a networked age, with a faster ability to have inventions and to scale up and double down on the inventions that actually work.

You know, the whole move from the agricultural age to the industrial age actually came with a super amount of pain, too. The pessimistic scenario is, roughly speaking, we have a serious youth-unemployment problem today. And when a large percentage of unemployed youths think they don't have a future, that usually leads to some form of civil instability. And so that civil instability can compound and create reactions that then actually block out the optimistic future.

### Who owns the machines?

**Matt Slaughter:** We have a deep kind of risk-taking culture, a lot of institutions concerned with how markets work—especially capital markets—and a lot of public policies that have supported job creation in America. My hope wavers a little bit if I add the adjective “good” to jobs. And I think that's a really important question.

It's quite clear, in the US in recent years, that we're not creating enough good jobs. People care a lot about their W-2s—what incomes are they earning? If you segment this by educational attainment, 96.2 percent of the US workforce since 2000 is in an educational cohort whose total money earnings, inflation adjusted, have been falling, not rising.

That includes even people with four-year-college degrees and nonprofessional advanced degrees. The only ones that have been rising are the PhDs, on average, and then the professional degrees: the doctors, the lawyers, and the MBAs. So that's a little sobering if you think about whether we are going to create good jobs. And a big open question that we'll probably talk about—and our panelists already rightly pointed to—is public policies.

**Laura Tyson:** I am with Matt on this. We live in a market economy. Supply and demand ultimately determine the level of employment. So a number of jobs will be created, but the quality of jobs is a huge question, I think. What's happening with the technology, which is skill biased and labor saving, is that it's eliminating middle-income jobs but is complementary to high skills. The jobs are high-income jobs because some smart people have to work with the technology. But there's a very large number of people who are being pushed down into lower-income jobs.

The second thing that's really important—it's been with us for a long time—is the growing gap between productivity and wages. And you can see this in the gap between productivity, a measure of the bounty of brilliant machines, and how it's being distributed in terms of wages.

If we had an inflation-adjusted, productivity-adjusted minimum wage today, it would be something like \$25 [an hour]. We would not be arguing about \$10. Public policy is, if anything, moving backward. It's certainly not moving forward at the level of the race. So the policy makers lose the race, and a lot of displaced workers, a lot of American families, lose the race. And that is my concern.

We're talking about machines—machines displacing people, machines changing the ways in which people work. Who owns the machines? Who should own the machines? Perhaps what we need to think about is the way in which the workers who are working with the machines are part owners of the machines.

### Getting the workforce to adapt

**Vivek Wadhwa:** So what we're going to see is automation. Right now, manufacturing is trickling back to the United States. It's not rushing back, because of the infrastructure costs, because of the difficulty in retraining a workforce. Give it 5 or 7 years and that trickle becomes a flood. Give it 15 years, and now we have the robots going out on strike saying, "stop the 3-D printers, they're taking our jobs away." Because everywhere you go, you're talking about decimation, decimation, decimation. We cannot retrain the workforce. Now, what are the solutions?

**Curtis Carlson:** Today, take any field—biotech, infotech, nanotech, energy, healthcare, education. Every one, right now, is wide open to revolutionary transformational developments. The only limitation we have is our ability to exploit them; that's the only limitation we have.

Maybe we're looking at the wrong symptoms as opposed to looking at the fundamentals—we are not innovating at the speed of the economy. We are not adapting fast enough. But just about everything you can imagine can be automated. So what does that world look like? It's hard to know. But in the short term, the number of opportunities we have in America is unprecedented. One problem is education. The good news is, again, that technology is beginning to create curricula that can transform education.

### Job quality and fiscal policy

**Martin Baily:** I was struck recently by learning that in one of our largest banks, the turnover rate for bank tellers is 50 percent a year. So, being a bank teller now is no longer a sort of skilled job; it's no longer really a well-paid job. We've had this change in technology, obviously. We've put a lot of the intelligence into the IT systems, so we don't need such skilled bank tellers. But if you ever go inside a bank, you sort of long for the days when the bank teller was more skilled.

The banks obviously have decided, as have Walmart and many, many other companies, that it's more cost effective to use workers that don't have much training, that probably don't have a lot of education—although I think training is more important—but instead to build productivity into the production system. They're very good at that. But it does create a huge number of not-very-good jobs, together with a set of jobs for the conceptualizers, the people that can take advantage of the technology, that have high incomes.

So this has obviously created a problem of inequality in our society. But also we're seeing that people who cannot get or don't have the gumption to get—you can go both ways on this—a good job are actually deciding not to work at all. So they're ending up unemployed. They're ending up on disability. They're ending up leaving the labor force.

Maybe there's a way we can have a technological initiative that could think about how we could change or adapt. I mean, we're not going to take the technology from this direction to that direction, to change the direction of technology so that it is more friendly, more complementary, to the mass of workers that are currently not benefiting from technology. If workers that have been consigned to lousy jobs suddenly see new opportunities opening to them, then I think there's more motivation, and they are much more willing to seek out the skills.

**Richard Cooper:** The most rapidly growing category of jobs, in this large stub of occupations that the Department of Labor records, was “other.” That is to say, categories that were not big enough yet to warrant their own line. And then of course under “other,” they did have some nascent industries identified there.

What people forget is that when there are innovations that destroy jobs—and, as I say, we've been doing that for at least two centuries, starting in Britain maybe two and a half centuries ago—incomes are created for somebody else. And to close the logical circle, you have to ask what happens to those incomes. It's a very important part of the process. And the incomes may be spent, but if they're going to be spent they have to be spent on something, and that something creates new jobs. We may not know what they are ahead of time, but that something creates jobs.

Where the private market won't do it—and there are lots of mechanisms in the private market that contribute to creating new jobs—but where it doesn't create enough new jobs, then we can do it through monetary and fiscal policy. That's how we close the logical loop. 

[Watch this extended version of the roundtable discussion on YouTube.](#)

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