Remarks for the Second AI and The Future of Work Symposium

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Hello everyone! It's wonderful to have you here for what I hope is becoming a November tradition for MIT.

Whether you've travelled from across the world or across the campus, I hope you are finding the conversations inspiring, enlightening, and at least a little bit fun.

What I love about this event on AI and the Future of Work is how it brings together technologists and economists, people who program machines *and* people who worry about whether we *should* program machines. We need all these ideas in the room together if we're going to take advantage of the full potential of AI.

It's not a challenge that we can wait to tackle. Today, artificial intelligence and robotics are beginning to permeate many parts of our lives, at work and at home. Machines are increasingly able to take on routine tasks so we can focus more on the strategic and fun aspects of our work and life.

You can use robotic lawnmowers to do your landscaping[1] and you can take robotic dogs for a walk.[2]

You can rely on a remote driver—located at a call center anywhere in the world--to help your autonomous vehicle navigate through traffic.[3]

You can play rock paper scissors with a robotic hand named Dextra at the ETH Zurich. Dextra uses a brain-inspired neural network and camera to determine your next move and execute a winning symbol 30 times faster than the quickest human.[4]

You can use a new mobile messaging app called Mei to help you understand whether that text from your teenager really *was* meant to be sarcastic. Mei leverages machine learning to root out subtext and offer suggestions for how to bridge communication gaps by behaving more like the people to whom you're speaking.[5]

You can buy food grown on indoor farms where mobile robots monitor and cultivate tomatoes, prune their vines, and even pick them when the moment's right.[6]

[1] https://www.wired.com/story/robot-lawnmowers-are-killing-hedgehogs/
[2] https://www.nytimes.com/2018/09/22/technology/boston-dynamics-robots.html
[3] https://www.cnbc.com/2018/03/20/remote-operation-may-provide-help-when-self-driving-cars-get-confused.html
[4] https://economictimes.indiatimes.com/articleshow/65785869.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst
[5] https://venturebeat.com/2018/08/06/mei-uses-ai-to-improve-relationships-by-analyzing-text-messages/
[6] https://techcrunch.com/2018/08/08/your-vegetables-are-going-to-be-picked-by-robots-sooner-than-you-think/)

You can even buy meals prepared by robots by visiting restaurants like Boston's own Spyce, where robots prepare all the dishes on the menu.[7]

The advances in technology aren't just making our lives easier or more convenient. Many of the breakthroughs we're seeing hold the potential for huge positive impacts on our world.

For example, Scientists at the Allen Institute have used machine learning to make incredible headway in understanding living cells. They've been able to train computers to see parts of the cell the human eye cannot easily distinguish. Human cells have around 20,000 different proteins—and if we could find a way to view them together, we could learn important information about both healthy and diseased cells. These tools could help scientists understand exactly what goes wrong in cells during disease, or to monitor how cells change as cancers progress or respond to treatment. It's a great example of a field where machines are doing something that humans just can't.[8]

A San Francisco-based AI company called Athena Security has announced implementation of an AI camera system it says can identify guns in crowds and alert police to the presence of an active shooter, potentially reducing response time.[9]

A coalition of companies and organizations are working together to launch a tool called the "Famine Action Mechanism," a still-evolving algorithm that will use analytics to identify areas that are most likely to experience extreme food shortages. This would enable international organizations to secure the release of funds to at-risk areas BEFORE the situation worsens.[10]

Meanwhile, cities and companies around the world are looking at ways to leverage AI to better understand natural disasters, and—potentially—even predict them, so we can prevent the greatest loss of life.[11]

There are a lot of reasons for us to be technology optimists. We've only scratched the surface of the many ways that AI will help improve our lives.

But as we work to make this promise a reality, we must also work together to prevent the biggest challenges AI will bring.

To be clear, I'm *not* talking about machines taking over the world. There are a lot of reasons to feel confident that won't happen.

But there are also plenty of reasons to worry about the unequal ways these benefits will be spread around. This isn't the first time we've gone through a major technological transition. There are always costs.

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[7] https://boston.eater.com/2018/4/27/17290330/downtown-crossing-robotic-kitchen
[8] https://www.sciencedaily.com/releases/2018/09/180917111545.htm
[9] https://www.zdnet.com/article/ai-security-camera-detects-guns-and-identifies-shooters/
[10] https://www.washingtonpost.com/technology/2018/09/23/world-banks-latest-tool-fighting-famine-artificial-intelligence/?noredirect=on&utm_term=.9c360fc9075f
[11] https://www.theverge.com/2018/9/25/17900018/google-ai-predictions-flooding-india-public-alerts

Not sky-is-falling costs. I don't believe that AI will put everyone out of work anymore than printing did, or weaving machines, or any of the other innovations that caused major changes in our workforce.

But it will *change* what work looks like.

As part of that change, some jobs will look a lot different. Over time, some may even disappear. There's no point in pretending otherwise. Thankfully, this change will be gradual, so we have time to prepare. According to Future of Jobs Report issued by the World Economic Forum, nearly 50% of companies expect that automation will lead to some reduction in their full-time workforce by 2022.

But many new jobs will also be created. According to estimates cited in the same report, 75 million jobs may be displaced, while 133 million new roles emerge—roles that are more adapted to the new division of labor between humans, machines, and algorithms.[12]

That division of labor between people and machines depends on understanding what machines are good at—and what they're not. To put it in the simplest terms, machines have chips and people have hearts. They have speed, and we have wisdom.

Robots can move with precision and perform low-level, precise work. AI can learn over time, identify patterns, and generate insights that humans would never be able to do on their own. Think of that cellular biology example I mentioned earlier. New breakthroughs are possible in that field only because of advances in technology.

But machines do not have empathy and programs cannot counsel patients on their treatment options. They can't replicate human reasoning, interaction, communication, nor advice.

It's not useful to think about jobs as people OR machines. The future is both, together, each suited for what it's best at doing, and filling in the weaknesses of the other.

We're already starting to see this division in labor in fields like medicine, the law, and even customer service.

Insurance giant Allstate has incorporated the use of an AI-powered cognitive agent named Amelia to help customers get concise answers about complicated insurance questions. But Amelia hasn't replaced human service agents. Instead, the customer service reps can use Amelia to help answer customer questions quickly, without having to memorize huge amounts of information about insurance and compliance regulations.[13]

The Future of Jobs report actually lists jobs in Customer Service, Sales and Marketing, Training and Development, People and Culture, and Organizational Development among the roles that are

[12] http://reports.weforum.org/future-of-jobs-2018/preface/

[13] https://www.forbes.com/sites/blakemorgan/2018/08/07/using-ai-for-customer-experience-at-allstate/#c74dcfe9d84f

expected to grow over the next five years, precisely because they call for distinctively human skills.[14]

In a global study of more than 1,000 companies at the forefront of implementing AI systems, researchers found that the greatest performance gains were achieved when machines were deployed alongside people—not in place of them.[15]

What's changing isn't the need for humans—it's what those human tasks look like. Take manufacturing, for example.

Today's equipment maintenance supervisor needs robotics and controls engineering skills. Equipment maintenance technicians need to be trained in analytics, so they can optimize maintenance procedures *before* the machines break. New roles include robot engineers, computer vision scientists, deep learning scientists, and machine learning systems engineers.[16]

Jobs like these are opening up around the world and across industries. But who will fill them?

That brings us to the big question underlying AI and the Future of Work: how do we prepare our job force for the coming changes?

According to research done by Northeastern University—in collaboration with Gallup—Americans are largely optimistic about the impact of AI on our lives. But they're nervous about what it will mean for jobs. 73% of Americans say an increased use of AI will eliminate more jobs than it creates. Understandably, this worry is particularly strong among those with blue-collar jobs.

But despite this belief, Americans aren't sure what skills they'll need to secure a job should they lose the one they have, and only 18% of Americans are extremely confident that they could secure the training they needed to get a new job.

18%. That's a really low number. And the sad truth is, that worry is well-founded.

We have a lot of work to do to figure out how we help Americans and citizens of every country prepare for the workforce of the future.

At MIT, we take action through activities like this symposium we are attending today. We also have a Task Force looking at questions like: How are emerging technologies transforming the nature of human work? How can we shape and catalyze technological innovation to complement and augment human potential? and How can our civic institutions ensure that the gains we make contribute to equality of opportunity, social inclusion, and shared prosperity?

MIT has also partnered with universities in several countries as part of a global Artificial Intelligence Academic Alliance. [17] We are looking at creating new degrees that connect

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[14] http://reports.weforum.org/future-of-jobs-2018/workforce-trends-and-strategies-for-the-fourth-industrial-revolution/?doing_wp_cron=1538361251.8779969215393066406250

[15] https://hbr.org/2018/08/why-even-ai-powered-factories-will-have-jobs-for-humans

[16] https://hbr.org/2018/08/why-even-ai-powered-factories-will-have-jobs-for-humans

[17] https://www.shine.cn/news/metro/1809182305/

technology with the needs of the world. This work includes creating bridges between computing and other disciplines, and between education and research. For example, we have recently created blended degrees between computing and other disciplines in computational urban science and computational economics, and are incorporating ethics in many of our programs.

We're also working with organizations like Bit Source, whose founders we heard from last year. They've done some incredible work teaching former miners to code, and we're excited to partner with them to make programming more intuitive and accessible, so that people who've gone through training can share that training with others.

Other organizations are exploring novel ways to find people to fill new, highly technical roles. For example, when Adidas opened an advanced manufacturing plant outside of Atlanta, they formed a partnership with local governments and technical colleges to help source the right kind of talent.[18]

Some businesses are creating inclusive possibilities for new types of work. If we need people in call centers to direct autonomous vehicles, these call centers can create new jobs in places where they're needed most, whether there's in the US, Nigeria, or any number of other countries.

But we can't rely on private businesses to solve the future of work challenge on a case-by-case basis. If we're going to prepare people all over the world for a new economy, we need to start now. That's exactly what we're here to do.

I want to challenge you all to consider two major questions.

First—How can we broaden the possibilities created by technology by changing our mentality to adapt to this new world order of data-driven performance and decision-making?

AI can help us do a lot more than build faster factories and automate standard business processes. I mentioned some examples earlier—preventing natural disasters and helping us understand the nature of disease—but I think there's a lot of potential still untapped. AI should be able to help us *all* get lifted to better lives, whether that's through new jobs that focus on the most meaningful parts of our work, new medical treatments that better target our illnesses, or even lawnmowers that know when it's time to trim the front yard.

So how do we leverage this potential, and help people help themselves by taking advantage of its benefits? Can we find ways to democratize new technology so it's not just something that will help a few, but rather, something that will help us all?

Second, how can we act now to begin smoothing out the inevitably bumpy transition to our new, AI-enabled world order?

This is a question that can only be answered in collaboration between university experts, technologists, business leaders, and policy makers. Someone will have to lead this charge, and someone will have to pay for it. But who? The employers who need people to fill these roles?

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[18] https://hbr.org/2018/08/why-even-ai-powered-factories-will-have-jobs-for-humans

Universities, whose role is to educate? Maybe governments, who are ultimately responsible for the well-being of the people?

It's not a simple question, and it probably doesn't have one simple answer. But it's a question we need to start exploring now. And it's one where the best solutions will come from all of us working together, sharing our knowledge, and looking for innovative new paths forward.

There are many reasons to be technology optimists—but that optimism carries a lot of responsibility. We can't just push technology forward and hope for the best.

We need to do the work to make sure the best happens. I'm excited to get started—and hope you are, too.