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Bio Revolution

AI in healthcare: Microsoft's Kevin Scott on how tech can treat a pandemic

Machine learning to develop vaccines faster; wearable devices to detect illness sooner: the COVID-19 pandemic could spark significant innovations in healthcare technologies.

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Breakthroughs in biological science are combining with continuing advances in high-performance computing and artificial-intelligence (AI) technologies in a Bio Revolution. The power of AI has already been proven in the response to the COVID-19 pandemic. The speed and scale at which researchers launched efforts to develop a vaccine were remarkable, and that owed much to AI-powered R&D. But there is much more to come from AI in healthcare, with a growing role in predicting, preventing, and treating COVID-19 cases—and even preventing the next pandemic.

In May 2020, McKinsey Global Institute cochair and director James Manyika spoke with Microsoft chief technology officer (CTO) Kevin Scott about the vast potential of AI in healthcare and his views on the broad possibility of the Bio Revolution. An edited excerpt of their conversation follows.

James Manyika: I'm delighted today to be speaking with Kevin Scott, one of the leading technologists in the world. Kevin is the CTO and executive vice president of AI and research at Microsoft. Kevin has built and led technology teams at various places, starting at Google back in 2003, then at AdMob, back to Google, then at LinkedIn, and now at Microsoft.

Kevin's quite well-known in the industry as one of the people who builds the largest, most capable technology platforms and systems. I'm grateful to be having a conversation with him. I should add that Kevin has just recently published a new book titled *Reprogramming the American Dream: From Rural America to Silicon Valley—Making AI Serve Us All* [Harper Business, April 2020]. Welcome, Kevin.

Kevin Scott: Thank you so much for having me, James.

James Manyika: I'm delighted to have you. I've been looking forward to this conversation for some time. I wanted to spend some time talking to you about what you're working on right now. You're building some of the largest, most complicated computer systems in the world, and much of that is being applied to AI systems. What are you most excited about right now in your work on AI?

Kevin Scott: We've been working on many things over the past couple of years. As you mentioned, [that includes] these very-large-scale computing platforms for training a new type of deep neural-network model. Some people called it "unsupervised," but we have taken to calling them "self-supervised learning systems."

I guess it's just a coincidence, but before the COVID-19 pandemic, I spent the past handful of months focusing on the intersection between AI and the basic sciences. In particular, the intersection of AI and biology is really fascinating. We're starting to do some foundational work there that is going to be useful for more than helping us resolve some of the challenges we're facing right now with the COVID-19 pandemic. I'm hoping we're going to see all sorts of fantastic, beneficial things happen after the COVID-19 crisis is over.

James Manyika: We are going through this extraordinary COVID-19 moment. You mentioned that one of the things you're excited about is the application of AI to tackle these healthcare and COVID-19-related issues. Say more about that.

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What are you seeing? How are you, your teams, and others applying AI to the COVID-19 crisis?

Kevin Scott: The thing that I would remind everyone of about machine learning and AI is that we should be thinking about them as tools that can be used fairly flexibly in a bunch of different ways. They’re not a thing in and of themselves.

If you look at how we’re using machine learning in our response to the COVID-19 pandemic, we’ve deployed a bot-based technology. For instance, people who believe that they have COVID-19-like symptoms are able to self-triage those symptoms so that we can help manage precious testing and hospital resources. There are additional efforts we’re working on right now around enrolling people who have recovered from COVID-19 to donate their blood plasma that contains antibodies for COVID-19. Then we can dispense them to a consortium of companies that are working on refining that plasma into a therapy for COVID-19. AI is involved in the enrollment experience and figuring how to route the collected plasma to the right places.

One of the most sophisticated things that we’re doing with AI is using molecular simulations—trying to figure out how we could, in a simulation environment, discover therapeutic compounds and potential vaccines that we can use to treat the disease. Basically, machine-learning models could accelerate some of the exploration and simulation in this compound discovery.

James Manyika: In other words, AI can have a remarkable impact as we search for vaccine targets because what AI could do in searching this huge space is beyond what we could do otherwise.

Kevin Scott: Yes, absolutely.

James Manyika: I’d love to hear you talk about this intersection between these AI techniques and the biological sciences. How big do you think this is?

Kevin Scott: I think it could be absolutely enormous. When you think about the set of events that led up to the industrialization process that happened right after World War II, it gave us our basic infrastructure that we have used to build most of modern Western society. I do see analogues to some of those conditions now with the COVID-19 pandemic. We are on a very accelerated pace, learning how important it is to make these investments. We’re going to see very exciting accomplishments in terms of where the biological sciences intersect with high-performance computing and AI.

I’m hoping we will take all of what we’re learning right now, and this sense of urgency that we feel, and transform that into action. It’s entirely conceivable to me that the next seven or eight decades of our existence as a human race might be defined by this set of technologies that are rooted in the biological sciences. And the accelerator, the spark that lights the innovation fire that hopefully happens, is this pandemic.

James Manyika: In our own research, we found that some 60 percent of the inputs into our economy are either biological or could be created in a biologically influenced way. And that’s a major part of the economy. If the breakthroughs you’re talking about could transform all of that, it would be enormous.

Kevin Scott: It’s incredibly rich, too. You have the things that we’re already seeing right now,

where AI plus biometric sensing is giving us powerful diagnostic capabilities. I don't know whether we'll get it in time to make a dent on the COVID-19 pandemic, but it's possible that you will have a smartwatch, a fitness band, a ring with biometric sensors, or another set of devices that are measuring your body temperature, your blood-oxygen-saturation levels, your movement, and your pulse rate. And the devices are putting the data into diagnostic models that could tell you when you are sick, or getting sick, way before you would ever notice. This would give us the ability to do medicine in a way that we can't do it right now: if we could treat people when they are less gravely ill, their chance of recovery would be much higher, and it would be cheaper to intervene then than after someone is symptomatic or more seriously ill. It may be something that helps us manage the next pandemic.

It also means that you can think about democratizing access to high-quality healthcare in a way that you can't right now, because it's too expensive. That's one end of the spectrum. Then you also have this incredible richness for what you're going to be able to do in terms of synthetic biology: building and engineering DNA and RNA structures in our bodies so that we can design better medicines and therapies and maybe defeat some of these diseases that have been intractable for a long while—medical conditions that are resilient to our ability to treat them well.

On the other hand, you also have the biologists doing incredibly cool things. You can now reprogram yeast to brew a whole variety of organic compounds that you then can use in manufacturing and building products in ways that are substitutes for part of the petrochemical industry. That is super exciting as well.

James Manyika: Kevin, I want to thank you again so much for joining us. I'm looking forward to when we catch up next and continue our conversations.

Kevin Scott: Thank you so much for having me. As always, it's a pleasure chatting with you.

James Manyika: Again, that was Kevin Scott. He's the CTO at Microsoft and the author of a new book, *Reprogramming the American Dream: From Rural America to Silicon Valley—Making AI Serve Us All.*

James Manyika, cochair and director of the McKinsey Global Institute, is a senior partner in McKinsey's San Francisco office; **Kevin Scott** is the chief technology officer and executive vice president, technology and research, at Microsoft.

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