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HOW CHINA AND THE U.S. ARE
ADVANCING ARTIFICIAL INTELLIGENCE

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PARTICIPANTS:

DARRELL WEST, Moderator
Vice President and Director, Governance Studies
The Brookings Institution

ROBB GORDON
Group Counsel and Director, China Legal Team
Intel

RYAN HASS
David M. Rubenstein Fellow, John L. Thornton China Center
The Brookings Institution

NICOL TURNER LEE
Fellow, Center for Technology Innovation
The Brookings Institution

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P R O C E E D I N G S

MR. WEST: Good afternoon. I'm Darrell West, director of the Center for Technology Innovation at the Brookings Institution and I'd like to welcome you to our event on AI in the United States and China. AI is advancing rapidly. It is powering autonomous vehicles. It's being applied in areas from health care and finance to the retail sector. Today, we're going to discuss how AI is being deployed both in China and the United States.

These are two of the leading places in terms of AI investment and deployment. We will look at a new developments, what the opportunities are as well as what the risks are. We'll take a close look at where each country stands in its AI development and what lies ahead. To help us think about these issues, we have three distinguished experts, Nicol Turner Lee is a fellow in governance studies here at Brookings and she writes about digital disparities and new developments in technology innovation; Ryan Haas is the David Rubenstein fellow in Foreign Policy at the Brookings Institution. He writes on us trying to relations and he has a Brookings paper entitled "U.S.-China Relations in the age of artificial intelligence" that's available at brookings.edu. Robb Gordon is a group counsel and director of the China legal team at Intel and he has devoted considerable time to understanding the legal and policy issues in China and how they affect American companies. And he's actually based in the Shanghai as well. And we do want to thank Intel for providing financial support for this forum.

So I want to start with Nicol. So you have written about AI and emerging technologies in the United States. How is AI being deployed here and what are some of the more promising applications?

MS. LEE: Well, thank you Darrell. Hello to everyone that's here, all my distinguished colleagues as well. This is a really exciting topic and we could tell by the number of you that are here that this is something that is of just growing interest I think among not just the technology population, but other people who are looking at how AI is applying to various use cases. And I would suggest that one of the ways that we're looking

at AI use in the United States is really around how is it creating greater efficiency when it comes to products and services on both the private and public sector. So we've seen a lot of AI applications and machine learning applications when it comes to just harnessing the power of the cognitive ability of artificial intelligence systems to just do better. I mean, I was reading -- I a sociologist by trade, not an engineer or sciences, but one of the things that we do know with AI systems is that they can harness the memory and the mind share of a human in much more rapid speed than we've ever imagined and that is both. And we will get into this conversation promising as well as scary. I believe the second uses of AI in the United States are around different sectors. And so as Darrell indicated, when it comes to retail, we're seeing AI applications when it comes to financial sectors the transportation sector, healthcare sector, educational sector, et cetera. And I think the deeper we go into how we relate these efficiencies within those sectors, I think the more innovation we're actually going to be seeing deployed here in the United States.

So what does that look like in terms of actual examples and use cases? And I'll just share just a couple of ones that most people are familiar with and some that you're not familiar with and then we'll go from there. Obviously, autonomous vehicles is one place where we're seeing artificial intelligence systems as well as machine learning algorithms really much embedded in that. Many of us who grew up probably around my time never would imagine that there would be something like an autonomous vehicle. I think the closest that I saw one of those was in the Jetsons when I used to run home to watch that cartoon.

And now we're seeing very much similar to Star Trek and the Jetsons and all those animated sci-fi movies where we will actually have cars that are driverless and AI systems would definitely power that. Facial recognition, I just returned from South-by-Southwest where there was a huge focus on facial recognition technologies and the ability to look at the modalities of the face and to predict that identification is being used in a variety of ways. On our phones, we now have cell devices or mobile devices that recognize us not by

a button, but by our face. We are actually seeing facial recognition when it comes to public safety applications being used by police departments and facial recognition using commerce outside of just unlocking our devices.

Job sharing and matching is another area which is very promising when you talk to human resource professionals who have to vet through thousands of applications to be able to identify the perfect candidate or higher education institutions. AI and machine learning algorithms are essentially helping them to sift through those and make what they think are correct assumptions about candidates, potential candidates, which we'll discuss a little later because they're not always perfect. And I would also say in bailing sentencing, we're seeing huge AI applications. Some would again say, promising again, in the decision-making that the AI enables judges to do you know, somewhat problematic, which we can get into a little later, but it's actually helping to sift through the huge piles of folks that are defendants that are waiting to be sentenced or applied bail. I could go on and on and on, but I always say to people when you think about artificial intelligence, the train has left the station here in the United States.

It may not be as Sci-fi and I'm independent or remote than what we think. It's as simple as the positioning a that comes up when it looks at Netflix videos. Those are using some level of artificial intelligence capability. It's as simple as the recommendations that show up when you access an ecommerce site. It's all being embedded, I think, in some of the very innocuous functions that we have as citizens. And it will become more in detail when we see those applications. Darrell applied to healthcare. We're seeing AI systems make decisions around surgical procedures et cetera. So it's very interesting. And I want to just be really clear as I studied this, there's this umbrella of artificial intelligence and then under that are these different areas where we're seeing different types of applications, whether it's machine learning algorithms or other types of technological applications. I have to say that because once I was on a panel and we kept saying AI, AI, AI, and then we kept saying machine learning algorithms, people were confused. And so I think this umbrella of

AI systems is again, going to apply across sectors as well as various use cases that are going to continue to improve the efficiency of decision-making that we as humans, we're not yet equipped or somewhat equipped to do, but not at the rapid pace that we're seeing AI systems operate.

MR. WEST: Okay. Thank you very much. So Robb, you currently are based in China, so you are on the front lines of the technology sector. So tell us a little bit about your experiences there. What are the opportunities and challenge that you have seen?

MR. GORDON: Sure. Thanks, Darrell. So I've spent the last seven years in Asia. The last three years had been in Shanghai and during that time I worked for Intel Corporation. I've helped our teams negotiate some huge strategic collaborations and agreements with partners from everything from autonomous driving to cloud computing. So I've been able to see how the technology has really changed over the seven years that I've been there. But not only have I seen it from a business perspective, I've also seen it as a consumer. I live in China and so every day that I walk out of my house, I'm constantly surrounded by artificial intelligence systems. I've got right outside my front door of my home in Shanghai, I have three cameras that I can see from my front porch. And I don't know what they're looking at, but there's three of them. My kids remind me of that daily. I don't ever carry cash in my wallet. I use WeChat Pay for everything. For those of you who have been to China, it's basically a cashless or it's turning into a cashless environment. I'm a frequent user of Taobao. It is basically Amazon on steroids. You can order something in the morning and it can be they're either afternoon, tomorrow morning. You can have something delivered at your desk. If you are thirsty, you want a Starbucks, you want to ice tea, you simply get on your phone, they know exactly what you ordered last time. They can -- they know what time of day you ordered it and they know your payment method. And so if you want, they will send someone up to deliver it to the very next day at that same time and with your same order. So it's fascinating. I'm just -- every day I am amazed at what type

technology is happening and transforming the lives of people in China and also myself as a foreigner in China. We -- I've become so dependent upon this. And I just said the other day, I'm actually relocating back to the United States this summer. And I said, how do I -- I don't know how I carry cash in my wallet when I have to go to the gas station and how do I go to Starbucks --

QUESTIONER: How do you go to Starbucks, right?

MR. GORDON: -- to get my coffee? And where -- I see their shared bicycles here in Washington D.C., but in Shanghai there it's such an easy app. You just scan a barcode, you get on, you leave it anywhere you want to leave it, similar to these electronic scooters. So it's fascinating. I have seen the AI revolution really take off and I've seen where the United States is doing some amazing things. I've also seen where China has been able to do some amazing things as well. And I've had the opportunity to partner with some of Intel's close competitors, also some of our partners, academia, universities and I've also been able to see how the industry has been changing over these past -- actually past six months. It's amazing. It changes daily.

MR. WEST: Okay. So Ryan, you wrote a Brookings paper on AI in China and you talk specifically about the possible ramifications for the U.S. China relationship. So what do you see as the risks and the opportunities there?

MR. HASS: Well, first of all, Darryl's, thank you for convening this conversation. I think discussing AI in the context of United States, China relations is absolutely essential. I'm glad that we're doing this. I hope it's a springboard to following conversations. As I think about the impact of artificial intelligence on the U.S., China relationship, I think about it both at the global level and also at the U.S., China level. At the global level, I see the United States and China racing out ahead of the rest of the world.

If a PWC is correct by 2030, the United States and China will capture 70 percent of the profits that are generated from AI technology. So that's \$15.7 trillion, 70 percent of which will go to the United States and China. That's going to widen the gap

between United States and Chinese national power relative to every other country in the world. So at the global level, the gap is widening. At the U.S., China level, I see artificial intelligence serving as an accelerant of rivalry and tension rather than a shock absorber. And what I mean by that is that artificial intelligence is going to exacerbate many of the tensions that are already latent in the U.S., China relationship.

Technology really is at the core of U.S., China competition right now. It's only going to intensify, but looking at AI as solely an accelerant of rivalry or tension, I think would be missing the big picture. I think the policy challenge that the United States faces is finding ways separate or disaggregate the areas of friction being caused by AI from the areas of opportunity for cooperation where both sides would benefit. And in order for us to get at that, I think it's important to break the U.S., China relationship down and do a couple of different components.

The first is, the military component and in this area, I think that artificial intelligence is going to create intensified rivalry or competition. As artificial intelligence gets woven into weapons systems, it's going to increase risk of rapid escalation between United States and China, which presents dangers for both countries. And hopefully, it will incentivize or motivate both countries to come together to think about rules of the road for how to manage AI in the context of military rivalry. When I think about the impact of artificial intelligence in the trade area, I worry that it could lead to bifurcated global systems that's not interoperable and I think we're already seeing this competition playing out with 5G technology, as the countries that are willing to accept (inaudible) technologies versus those that aren't and that could be just the leading indicator of a broader trend.

When we think about the impact of artificial intelligence and the political sphere of the relationship, I think that there also is tremendous risk if either country weaponizes artificial intelligence as a tool to interfere in the other countries' political systems. It will create enormous challenges, it will be very hard for the United States and China to manage as part of the relationship. So that's all the challenges. It sounds like a

pretty tough story so far.

I want to close with the potential opportunity and this is in the social space. There are areas and Nicol touched upon this briefly, like access to medicine, improving healthcare, improving access to education. Where both the United States and China are navigating the frontier of technology together and hopefully, we'll both be able to learn from each other and share best practices with each other so that we each find ways to improve the ability of artificial intelligence technologies to improve the lot of American and Chinese citizens. And on top of that, both societies are going to be navigating how to deal with all the impacts, all the disruptions that are caused by artificial intelligence. And again, I hope this is a space for both countries can learn from each other as they go forward.

MR. WEST: Okay. Oh, thank you. So Nicol, you've learned about the problem of biases in AI system. So what should we be concerned about a here and how should we deal with the possible biases?

MS. LEE: So I think it's interesting and all the things that all of us has spoken about so far, it does not say that there is not any type of bias or discriminatory effect that comes out of these systems. And we have a paper coming out of Brookings shortly on algorithmic bias detection and mitigation because embedded in the systems are not just computers program themselves, but people programming these systems and when people program systems, they come with a set of assumptions whether implicit or unconscious bias, or explicit biases that actually manifest within the actual computation or procedure.

In addition to that, people often use or technologist may use data which is flawed from the onset, right? The data may not have enough data points that can actually give a greater picture of what that looks -- of what the application looks like or skew out disparate treatment or impact on certain protected classes. Facial recognition is a really good example of that. I'm here in the U.S., facial recognition systems are widely deployed. Police districts are using them in massive numbers for public safety concerns, but they're not always right. Researchers around the country have suggested that in the case of African

Americans here in the U.S., that a darker skin tones are not picked up, particularly black women or they're misidentified as black men. And so things like that have to change, which I think is interesting going back to the China comparison. I mean, in China, the China application of facial recognition technology has an eight and 1,000 error rate, which I think is also very interesting as well. And you might ask yourself, well, why is that compared to the U.S. and it kind of goes back to what Ryan is talking about in terms of they're collecting data at several points and in several places, Robb mentioned that, so their data is so much more vast because their privacy protections are a little less stringent than other countries. So that's one factor for that as well. In addition to that, it could be said from a research and development perspective that the differences that exist for the United States are less easy to cast versus if you're in China where there's a little bit more homogenous characteristics in terms of facial qualities. I say that to say that we've got some competing interests when it comes to the deployment of that technology, particularly, when we look at AI systems across the two countries because those regulatory permissions or those legislative or national permissions allow for China to be a little faster in the development of certain technologies and deployment of those technologies as well, which is why you can have a cashier list on a store who recognizes you by face, right, and great accuracy. Whereas, if I were to go someplace, it may not be as accurate as possible, which is probably one of the reasons I never purchased one of those phones to identify my face. I changed my hair up often and I was a little concerned that I would be recognized, right, because the technology is not as great here. But those, again, as Ryan talked about, have implications, particularly if they're weaponized in some way or even if that bias is used in a way that keeps persisting discrimination and inequality standards.

So when we were in China recently, and I'll just close here, it's interesting that the Chinese don't look at that public interest implication when they roll out technology and in a conversation that we had. They see it, but their goal is ubiquity and not necessarily looking at how different communities react or respond to different AI systems. Where in the

U.S., the conversation has been around more white box thinking as opposed to having these models that sort of go into some kind of technological process and may learn differently, right? We're concerned in terms of civil society and government, what are the potential outputs on community? Will they be denied a loan? Will their face subject them to over surveillance? Will there be privacy concerns in the collection of that data. So it's been an interesting tension and an interesting rub that I think exists. Darrell, to your point, even when we look at the concept of bias across the two countries.

MR. WEST: Okay Robb, so some American companies complained that they have to share intellectual property with local Chinese partners and then they worry about how that is going to affect their businesses. How should companies handle issues like that?

MR. GORDON: That's a great question. It's one of the topics in these current trade negotiations between the two countries right now, whether it's forced transfer of technology. In order to go over and do business in China, to be successful, there is some sort of sharing that has to take place. As you can't go in as a wholly owned company and expect to operate business in China with the same benefits as a local Chinese entity. You have to safeguard your technology, but you also have to realize that this is the cost of doing business in China at some level. And you have to be able to decide, well, what are you willing to share and what are you willing to allow your engineers to develop in country?

We have found that what happens in China, at least with the multinational companies, there's a lot of the local hires will come and they'll, what we call hop, right? They'll stay at our place for two years. They'll gather as much information as they can. They'll get a good name on their resume, then they'll go from an Intel to, I don't know, maybe a Lenovo, maybe they'll go into pharmaceutical. And with each of those changes they are collecting intellectual property. They do sign nondisclosures, they sign employment agreements. How enforceable those are in China is another question. It's challenging, but I think as a company when you go in and you're setting up these operations and these

collaborations with local entities, you have to realize going in, eyes wide open that this is a risk. And there are, there are certain -- there's certainly a challenge that we face at Intel.

MR. WEST: Okay. Ryan, our colleague, Bruce Jones, has written the quote, "The era of U.S., China cooperation is drawing to a close." Where do you see the two nations cooperating and where are they competing?

MR. HASS: Well, that's a big question, Darrell. I guess the way that I would think about it is that the 40-year period of U.S., China relations, it has taken place over the past 40 years is drawing to a close. We are at an inflection point. A transition to another period of the relationship at the beginning of the new chapter. The way I think about the new chapter is one of competitive interdependence. This idea that the United States and China fundamentally are competitive, but the competition needs to occur within a recognition of the fact that both countries also are interdependent on together. Other, in other words, there should be a guardrails around competition because if it were to veer out of control it would do self-harm to both countries. And that's the first thought to respond to your question, that we need to come up with a new concept for where the relationship is and where it's going.

The second thought is we need to have a little bit more clarity about what it is that we seek to achieve and what it is that we seek to avoid with China. And I would just offer a few quick ideas that I welcome everyone's reaction to. The first is, I think we need to be clear about the need to try to deter China from eroding the credibility of our alliance commitments. We also need to try to be clear about deterring China from seeking to establish a hedge (inaudible) sphere of influence in Asia that is exclusive and exclusive of us. At the same time, we need to work to continue to outpace China in terms of technology and innovation.

And on top of that, the fourth point, we need to try to encourage China to take on a greater share of burden commensurate with its rising national power for dealing with global challenges that we alone are unable to address. Things like climate change,

nuclear nonproliferation, pandemic disease prevention. These are global public goods, not just American issues. And China is a leading global power. We should welcome them to sit alongside us in addressing them.

MR. WEST: Okay. So Nicol, in your opening remark, you mentioned facial recognition and software, and there's concern that China is using AI combined with video cameras and facial recognition to build a surveillance state. So should the U.S. strengthen its export controls to countries that use technologies in that manner?

MS. LEE: Yeah, I think that's the big question that we're having in the U.S. when it comes to these ethical uses of AI. And particularly in the United States, surveillance is one big area. Surveillance is not new. I want to continue to tell that to people. This is not an issue that just came up because of AI. We've had a history of surveillance in this country for years beginning with a militant movements that actually happened over various political resistance. It's just so happens that in this country we also have a constitutional binder that says what can and cannot happen and what's appropriate. So I think, Darrell, to your point, I think because the networks in China are larger, more dense, there's more data collected on individuals, many more places where you see cameras like Robb said, looking out of his own apartment, that collection and the surveillance use of that data in China is appropriate for that context, but troubling for us here in the United States.

And I think that's something that we, as a country have to continue to grapple with. And it goes back to, I think what we've sort of been saying on this panel, these good and bad use cases of AI. In the United States, do you want a heavy surveillance to pick up a criminal who has just recently robbed a bank? Of course. Do you want it to be you mistakenly? Of course not, right? And so we have these challenges on whether or not that is an ethical use of AI in ways that actually benefit the public good, which is what we focus a lot of any kind of technology appointment here in the United States. That's basically the framework that we regulate and legislate. It's no secret that that's really at the core of why we do the things that we do here in the U.S.

So I would say to your question it's troubling and I think it's going to be a conversation that we're going to continue to have. Interestingly enough, the technology that China is using in deploying is fantastic and there's much that we can learn from actually how they're doing this because obviously, in the test that we have around facial recognition, we're not at 100 percent accuracy when it comes to deployment of that technology. And that continues to come out over and over again.

MR. GORDON: And they say that by 2020, they want to have 450 million surveillance systems in place.

MS. LEE: Yeah.

MR. GORDON: And it's not just facial recognition because a lot of the locals were starting to wear the hoodies, starting to wear the face masks so they wouldn't be facially recognized. So now, they've got technology and you may have read about this where they can actually identify you based on your walk, your gait.

MS. LEE: Yeah.

MR. GORDON: Right. So now, what are you going to have to do, hop or skip or do something different so they don't identify? And I know there's a city, I forget this city in southern China where for jaywalking they will publicly shame you. They will put your photos up in the local county offices and say, well, so and so jaywalked on this day and so it's like, wow. Okay, I will try not to jaywalk next time to avoid my picture being in the post office, right.

MS. LEE: That's right.

MR. WEST: But Americans are doing the same thing via Facebook, via social media.

MR. GORDON: Yeah, exactly. It's very similar.

MS. LEE: Yeah, we are shaming, public shaming via social media.

MR. GORDON: Yeah.

MR. WEST: So Robb, that fits with my next question for you.

MR. GORDON: Yeah.

MR. WEST: So last year was the 50th anniversary of the 1968 movie, 2001 A Space Odyssey that features a super computer, Hal, that goes rogue and murders someone. And I apologize for revealing the ending though, (laughter) but how should we think about the ethical aspects of AI? What limits, if any, should we impose in order to protect fundamental human values?

MR. GORDON: Wow. It was also the 50th anniversary of Intel, (laughter) --

MS. LEE: And wait a minute and I wasn't born then.

MR. GORDON: Last week, China opened up their second National People of Congress in Beijing and Robin Li, the CEO of Baidu made a statement and he said, when it comes to AI, the two things that he's really concerned -- well, the number one thing he's concerned with is the ethical treatment of this data. How do -- what do we do with it? And so much in China and even here in the United States, is not open. It's not open data. And that's what we want that open data, the government in China controls so much of it and they collect it through those 450 million surveillance cameras that they're going to have in place. They control that data. They have access to it.

What are they doing? Are they sharing it? You even look at some of the larger corporations, maybe they're state-owned enterprises and they're getting that data. How, if I'm an end user, who are they sharing that with? I go into a bank to get a loan and they say, well, no you can't because you missed a payment when you bought something on Taobao. And now you -- Alibaba shared that data with Ant Financial. And so, do I know that as an end user and China's also taking a lot of their systems and going to developing countries.

They're going to South America; they're heavily invested in Africa; and they're putting these systems in these countries where I'm not sure that people know what they're giving up when they get -- see all the cameras on the streets and what are they agreeing to. So these are -- I don't have the answers, but these are certainly concerns that

at Intel we're very focused on. We're concerned about, I think the tech industry's focused on, and it was interesting, I was with Baidu last week and we -- Baidu's a local Chinese company. Intel should be multinational. We're different, we're treated a little bit differently, but we have the common interest, right? We want that openness of data. We recognize that there are these privacy concerns. China has a cybersecurity law that says you can't transfer data outside of the country if it meets certain criteria. Well, as a multinational we have to process maybe some of our data in different countries. How do we do that?

So there are concerns, I think a lot of us that are doing business in China, we're talking and fortunately, the regulators in China and those that are making the laws, they have open ears. They really are listening. They really understand our concerns and so I think that's the encouraging part is that they're willing to listen to us.

MS. LEE: And Darrell, can I just jump in there too? I think the ethical question is something that again, a lot of people have become very engaged in because it kind of goes back to what Ryan was talking about, right? There's the national security weaponization of your information that can be used in ways that shut down your energy systems or your financial systems. But then there's this individual weaponization, right? Where you, as an individual, because of your loss of privacy or data, you're not sure where you're being surveilled or you're not sure why you did not receive that individual or personalized loan or you're being denied credit for other things or denied health care. And so I think those are, again, use cases when it comes to cooperation. And I think this is another area where there's been some discussion from a global governance perspective.

Where are these use cases that we need to be very careful of deploying AI systems as the only answer without any type of human moderation or any type of global governance structure around those kinds of conversations. Because if not, it becomes a free-for-all and it becomes this race to the top. And it basically subjects people, citizens too not only the good but the bad. And that's why I think it becomes really challenging.

MR. WEST: So Ryan at the previous party Congress, not the one last

week, but the one before that, China announced its plan to spend \$150 billion on AI over the next decade and become the global leader by 2030. So how big of a problem is this for the United States and how should the United States think about responding to that?

MR. HASS: Well, it's clear that the United States and China have different models for addressing this issue of artificial intelligence. The Chinese model is a state-driven centralized model where they're trying to drive forward progress as quickly as possible. They've established these benchmarks that they're trying to hit by 2025 which is six years from now, China wants to be making major breakthroughs on artificial intelligence and by 2030 they want to be a world leader in artificial intelligence.

They also want to try to reduce their reliance upon external inputs to fuel their technology innovation. And so they've put together an ambitious agenda. I read recently that the city of Tianjin is going to outspend the European Union in terms of AI research and development over the next several years. That's an extraordinary thought, the fact that it's a city that most of you probably have heard of, but many Americans probably haven't. So it's going to, to outspend the European Union. So there's no question that the Chinese are devoting massive amounts of resources to achieve their ambitions.

So the question then is what should we do? And I think that there's a healthy debate that's already beginning about this. Senator Rubio recently has called for an American form of industrial policy to compete with the Chinese. Others are a little more wary of the idea of trying to out Chinese, the Chinese on these issues and think that we should have a lot more confidence in ourselves and the fact that companies like Microsoft were founded in garages; Google was founded by a couple of grad students. There is a method to the American system that's worked for a long time and worked quite well. But I would just offer a couple of ideas.

The first is we need to remember our strengths. We have comparative advantages and our ability to attract the best talent from around the world to come, want to work and live here. We have the ability to allocate capital much more efficiently than the

Chinese do. We have the world's premiere education systems. We have a disproportionate percentage of the world's superstars in artificial intelligence. We have strengths in this competition that we shouldn't lose sight of. We also need to remember that the Chinese aren't 10 feet tall. They can't see around mountains, they can't predict the future and there is a risk that the massive amounts of money that are flowing into AI research and development will lead to bubbles. We've seen this before with other Chinese industrial programs. Misallocation of capital is another problem. Having the party interfere in business decisions is a challenge that they have. And the Chinese also have risk of being cut out from global supply chains, ICT supply chains. And so I would just offer that it's not a foregone conclusion that the Chinese are going to prevail on each of their ambitions and that we're going to stumble.

I think that the story is far from finished. I think we're closer to the start and the finish of the story actually. And I think that we can also look at it two models and this is where I'll stop. The Chinese devoted massive amounts of energy to becoming a world leader in rail technology. And they succeeded. They have done an incredible thing with a rail technology. They also invested massive amounts of money to become a world leader in commercial aviation and aircraft and they have not succeeded. And so let's just have a little bit of modesty about our ability to anticipate where this is all going to go.

MR. WEST: Okay. One question for the panelists and then we'll turn to our questions from the audience. What lies ahead for AI in each country? If we're looking out five to 10 years, what do you think the AI environment is going to look like? The United States and China, Nicol?

MS. LEE: So I actually think, based on how I started my remarks that we're actually going to see an AI system in the United States that is going to be somewhat still segmented in disparate, right? It's going to be very sectorial driven, my opinion. I don't think that we will see in the United States the integration of AI as we've seen it in China. I think China will continue to lead with that. The fact that we chat and other systems are sort of

interconnected and the Chinese have created what I consider to be more of an ecology of AI versus what we've seen the United States. And I think that has a lot to do with the ethical considerations of how the U.S. is looking at the deployment of these systems.

So I would say that that's going to happen. I think in the U.S., one other thing I would say, just to echo our Ryan's point that the U.S. will continue. We've seen this with the recent Trump that station that came at or around AI policy is that the United States, will continue to invest and we'll see a lot more talent development in diversity strength when it comes to AI systems and just R&D. I think we're going to invest more money in R&D in the United States, more than we've ever before in computer science or engineering projects. I think China will continue to do so, but I do agree that what's going forward is the economic vulnerability of the Chinese government -- Chinese economy and the government will actually be what will either grow or doom the growth of AI systems.

MR. WEST: Okay. Robb, your thoughts?

MR. GORDON: So I think China is going to continue to push towards indigenous technology in all sectors. That's not going to change. I do think that they are going to start realizing that they do need to loosen some of their current restrictions, whether it's a data privacy, cybersecurity, I think we might see some changes there. They're already looking at changes in the foreign direct investment legislation. I do also think that you're going to see a more of a monopolistic view in China. You're not going to see these competitors. We're seeing it today.

The Deedee car shared services is acquiring Uber and all these smaller competitors, they're just going away whether it's for shared bicycles, food delivery, online payments. There's many companies that have tried, but Alipay and WeChat are still the dominant players. And there's really, at this point, there's no room for additional competition. So I think you're going to see that and you're -- I think you're going to continue to see subsidies. I think you're going to see the government continue to put money behind these and it's going to make it difficult for foreign companies to enter these markets. I don't see

that changing. And I do see China continuing with this mentality that this is a race that they have win. They followed every other race in the past, but this is the one where they believe they're ahead and they can actually win.

MR. WEST: Ryan, your thoughts on the future?

MR. HASS: Well, I think that Nicol and Robb have already covered the ground very well. So I will just supplement it with a three places to watch in terms of the U.S. context and Darryl, I'd love to hear your thoughts if you're willing to share them on this -
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MS. LEE: Yeah.

MR. HASS: -- but the first is whether or not we can prioritize STEM, STEM training as a core component of our educational system because this is the pipeline for the future of engineers in AI technology. The second is whether or not we'll be able to improve our immigration system to be able to continue to attract the best and brightest minds and make it easier for them to come to the United States and plug into our ecosystem.

And then the third area to watch, I think will be whether or not the United States will be able to rebuild the triangle of innovation between the governments, labs and the private sector. Those ties and that triangle have frayed in recent years. I think to the detriment of U.S. economic competitiveness and it will be important for us to watch whether or not we can rebuild those ties.

MR. WEST: Okay. Since you asked me to answer it, I will take that challenge. So last year, I published a book called The Future Work Robots, AI and Automation. And in the book I argued that people -- I think people are going to be genuinely shocked how quickly the AI revolution unfolds. Because when I talk with people, for example, about autonomous vehicles, I still hear people thinking that's going to happen five and 10 years down the road. It's going to happen much sooner than that. I mean, even in D.C., Ford is now going to bring cars in for a pilot testing. I'm looking forward to seeing how those cars perform on the D.C. traffic circles. That could be a challenge for AI systems, but I

think the biggest uncertainty going forward in terms of how AI will play out will be the policy environment because for most of the last 30 years in regard to virtually every aspect of technology, America has had a libertarian policy where we basically have delegated innovation to private companies.

We let them develop the products, what products they want, when they went to deploy them with a very few restrictions. Now, we're seeing a growing tech lash, kind of a backlash against technology. They're starting to be some policy changes that are interventionists that are not a libertarian in nature. The state of California has already enacted a very strong privacy law. The city of Oakland has banned the use of facial recognition software. You can kind of go technology-by-technology and at the local level, at the state level, and possibly at the federal level there could be changes. So what AI will look like five years from now or even 10 years from now, I think the big variable is going to be public policy, but it's uncertain where we're going to end up on that continuum from kind of a libertarian stance versus a more interventional stance.

On that note, why don't we take some questions from the audience right here? There's a question. There's a microphone coming up and if you can give us your name and your organization.

QUESTIONER: Hi, a Christian (inaudible) foundation.

MR. WEST: If you can speak a little more into the microphone.

QUESTIONER: Yeah.

MR. WEST: There, that's better.

QUESTIONER: I'd to go back, particularly, to Ryan's part one, which was the positive markets, that'd be health, education. I was wondering what you thought of Jim Kim's recent idea. It's actually on our LinkedIn interview. He said, maybe you could put three groups together. So if you have America and China off in this race, you actually have his five countries which are ahead on human capital, which happen to be, if I got it right, Japan, Korea, Singapore, Norway, Hong Kong, if that's -- and then the third thing is who's

actually got the big data which really matters for the poorest.

So if you take the Bangladeshi case of 45 years of developing things from the bottom up, the biggest single model for bottom billion banking for the poorest women is owned by the partnership of NGOs, which Brexit's in the middle of, but where the coding has come from. MIT's come from Kenya and Paza. It's come from Gates and it's now partly Jack Ma. So this gives you an example of maybe how things are just the race between these two countries or at least on the positive markets. Maybe we should be trying to create them so they're not. So I was just wondering are there any markets we're going to get right like that?

MR. HASS: Why don't you take that one?

MR. WEST: I think you've stumped the panel on that question.

MR. HASS: Chris. I'll offer it a quick thought, which is that, I hope you're right. I'm not suggesting that the United States and China racing out ahead of the rest of the world is a good outcome. I was just making the observation based upon available information. But I -- the reason why I think many people make that observation is because the United States and China have attributes when it comes to artificial intelligence that are just not replicable in any other country in the world. It's the abundance of data. It's the Darwinian entrepreneurial systems. It's the regulatory frameworks that exist, but most of all, it's the talent. There are a finite number of companies, AI driven companies in the world. Fifty percent of them are in the United States and a third of them are in China. And so you just sort of, you developed this momentum behind the pace of innovation that makes it hard for other countries or companies to catch up to.

MR. WEST: Okay. Right here on the front row, there's a question. And again, if you can give us your name and organization please.

MR. SHAVON: Thank you. My name is Neil Shavon and with the American legion. I want to thank you for taking the time out to come out and explain all the things that we need to know about this topic. So my question is that, at least from what I derive from

your testimonies about AI is that it's a prevalent thing, especially in the consumer market retail, especially like those sectors. But there seems to be a large deficit in terms of the defense federal level like procurement of AI technologies.

The defense budget that was released at 13 hundred a day allocated 4 percent of its military budget towards a computer based intelligence systems. Now, if that's only 4 percent, how can imagine if that is exactly directed to AI, maybe give even a percent or less. So that's all computer-based systems and military defense budget that was released a couple of hours ago is just going to those kinds of technologies. So why is there that large gap?

And even I've spoken to, I think a General David Goldfein, spoke here a couple of weeks ago and he made that plea like we need to get ahead of this, especially on the military aspect because it's the growing thing or for as of tomorrow will not be fought in the battlefield, will be thought behind keyboards or of sorts of that. So even with the people at his level, the chief of staff of the Air Force procuring these ideals, why is there still that lack?

And just to give it another example the peak of C4 four or intelligence computer-based intelligence the budgets was in 2011 in the last 10 years at 11 billion; last year, it was 8.6; this year it's 10. So 1.4 increase, like nothing crazy. And then tomorrow -- next year is projected at 10.2. So even less of an increase. So why do you think -- why did you guys feel, at least why there's that big gap on Capitol Hill or in the military aspects of everyone is saying we should do it, but it's not getting done it.

MR. HASS: Well, I'm happy to offer a thought, but then I'm going to accede the floor to my colleagues that the Chinese, I think, will welcome the trend line that you're suggesting because it really reinforces what are their assumptions about the United States, which is that the United States has invested so heavily in these traditional weapons systems. It's built such a dance pipeline and an interest groups around the development of these major weapons systems, aircraft carriers and the like, that it's going to be very hard for the

United States to deviate away from these legacy weapon systems without doing harm or, or dislocations to parts of the American economy.

And the Chinese have expected that we would operate that way and also assumed that artificial intelligence technology will provide a leapfrog technology right for them because they're not as wedded to the construction of these legacy systems as we have been. So I hope that's wrong, but that's the -- I think the way that they're going to see it.

MS. LEE: Yeah, I would agree with Ryan. I think the leap frogging in terms of government budgets around where they go into next generation emerging technologies has always been slow. It's not just a defense, but it's across the board. And so I think to your point, years ago we talked about cyber warfare with the quotations around it and now it's real, right? And now we're seeing artificial intelligence weaponization manifesting in ways, like I mentioned earlier, where it's breaking -- it could shut down grids, et cetera. I think until that threat becomes even more realistic to legislators who quite don't understand this, I don't think it's the Department of Defense saying, hey, give us less. I think its legislators are not really understanding also the impact of what this technology will do in terms of national security.

MR. WEST: And I'll just add a quick footnote to that. I think the Pentagon understands it does have a problem in this area. So it recently launched an AI Center to recruit new talent and to deploy new solutions in that area. A few weeks ago, President Trump issued an AI Executive Order --

MS. LEE: Right.

MR. WEST: -- where he basically told all of the agencies, both defense as well as the non-defense agencies, they needed to do a better job because obviously, in our private sector we have tremendous companies, great innovation, lots of deployment. When you look at the public-sector part in the United States, government is woefully behind across the board. And if anything defense is actually doing than the non-defense departments in

terms of AI deployment. So, but the problem with the Trump executive order is even though it moved things in the right direction by basically saying, hey, we need a sense of urgency on this question.

He didn't really allocate a particular budget to encourage AI, deployment, defense, or non-defense. And he also did not address inner agency coordination. Like you don't want every department and every agency coming up with its own AI solutions. You want more general deployment there. So even though what he did was constructive, it clearly doesn't go far enough. Right there, we don't have much time, so let's take another question, right here.

MR. CHECCO: Thank you very much. Larry Checco senior advisor to Serve USA. A question that's unanswerable and then I'll ask one that's the answerable, but the question that's unanswerable --

MR. WEST: We love those unanswerable.

MR. CHECCO: -- yeah, exactly. But is AI improving our lives and if not, why is this species are we allowing this to go forth? I was in China last year about this time and it was the first time I ever heard about social credit, scared the bejeebers out of me. And my -- to bring this question full circle, Darrell mentioned policy. It seems to me unwittingly, we are giving our lives over to governments that we have to implicitly trust will do the right thing with this information. That scares the bejeebers out of me too. So I mean, am I being overly fearful?

MR. HASS: Well, I think a lot of people share your sentiments, but is AI improving our lives? I said, absolutely.

MS. LEE: Absolutely.

MR. HASS: I think anyone in here who uses a search engine, who uses Google. You type it in, instantly the results come up. If you didn't have AI, you wouldn't be able to get those results that fast. There are -- the cloud, there's so many things that AI can do for us to benefit us on a day-to-day basis. Going to social credits in China, that scares

me as well. Right. I don't know that that's the direction that I certainly want AI to go in. Will it go there? It's going there, it's going there actually slower in China than we think.

MR. CHECO: What about here?

MR. HASS: Here, I think we'll see what happens. We'll see what happens. We'll see if it's successful. I think at some degree, at some level, it may, absolutely may. I mean there's autonomous vehicles today or that will be coming out, but they will be able to calculate your speed and the stoplights that you have run and they will send that data to the cloud. The cloud will then send that to Geico and Geico will know that, hey, you ought to be charged more on your insurance and you're a bigger risk than we thought. Right. So that, so that's going to happen, right? Those types of things will happen. Whether your social credit is like they're proposing in China is actually going to come here to the United States, I don't, I don't see that happening immediately.

MS. LEE: Right, not without lawsuits.

MR. HASS: Correct. Correct.

MR. WEST: Ryan and/or Nicol, is AI improving our lives?

MS. LEE: Yeah, I think so.

MR. WEST: Right, that is the question.

MS. LEE: No, I think so. I think that there are certain, to your point, I think AI generally is improving our lives. Whether or not there are some things that should go towards the automated decision-making is questionable, right? Not everything has to be having an AI system applied to it to be perfect. And I think there's this rush to not only race to AI, but there's a race to automate everything that has social costs and economic consequences for workers and others, communities, et cetera.

An insurance company deciding to use AI to manage claims in a small town in the United States doesn't mean that they're going to be profitable because they can manage quicker. It means that there's going to be a whole lot of people in that small town where they'd been the dependent employer that will be unemployed. And so again, I think

it's really a matter of what's the objective of the AI; what's the problem that we're trying to solve; what's the use case; and then looping in some type of consumer feedback or user feedback to actually see if it's actually working. I think those kinds of systems are actually going to drive a lot of the ethical cases and the conversations around the ethical use and fairness of those systems.

MR. CHECO: And the lack of our participation.

MS. LESS: Yeah.

MR. CHECO: This is happening to us. We have no say in this.

MS. LEE: Yeah.

MR. WEST: I would answer your question in a slightly different way and I would also put it in a bit more of a historical context. So this morning we had a book of event, Tom Wheeler, a visiting scholar in governance studies, has a new book out entitled From Gutenberg to Google. And so he's kind of looking at the 500 plus year history of technology innovation. And what he points out in his book is technology's always disruptive. So when you ask is it improving our lives, like every technology improves our lives and imposes threats, problems, challenges and difficulties at exactly the same point in time.

What we have done with past technology innovation is we try and maximize the good features and then we use policy laws, regulations, self-regulation, and now we call it crowdsourcing on public constraints --

MS. LEE: Right.

MR. WEST: As a way to mitigate the downside. And Tom argues that we're going to be moving in that direction with digital technology as well. And so it's always going to be a mixed bag because most technologies are dual use in nature. Like even something like facial recognition can be used for mass surveillance. It also can be used to find missing children.

MS. LEE: That's right.

MR. WEST: And so how do you get the good side without getting the bad

side? That then becomes the role of public policy to try and regulate the things that we know are going to be a bad applications. On the aisle right there, I think we have time just for one more question. Right back there.

MR. PATEL: Coming back to (inaudible) Patel, I am just an average Joe citizen, not affiliated. Coming back to the question, China versus U.S., so does China apply different standards for human safety when they're deploying artificial intelligence and if they do, does that give them competitive advantage to you and are against U.S. and does what can we do to level it?

MR. WEST: Okay. Thank you for that question. Panelists?

MS. LEE: So just to paraphrase, want to make sure I understand the question? Can you repeat the question one more time?

MR. WEST: It's kind of does China apply different standards when it comes to human safety when it's thinking about AI and new forms of technology?

MR. HASS: And does it give an advantage? I think, I mean China, I don't know that they have a different system of viewing safety towards their citizens. I think they're very concerned about the welfare and safety of their citizens. I think, however, the citizens are willing to give up a certain degree of privacy for some convenience.

MS. LEE: Right.

MR. HASS: That is absolutely true. They're willing to give up more than I think we are here in the United States.

MS. LEE: That's right.

MR. HASS: In just the example I gave, they're willing to give some of their preferences, so their tea and their pizza can be delivered to them at the office. They're okay -- I mean, they know that there's this facial recognition. It matches their national identification card. We would have an issue with a lot of this, but I don't think that China has a different standard than we do as far as the general safety and welfare of their people.

MS. LEE: Yeah. I would actually on that, I would say, no. The type of

research and development that goes into Chinese technology, particularly in this area is spectacular. And being very specific around any type of consequence to that. I think that's where I think it was already mentioned where the U.S. and China will learn from each other when it comes to these technologies and what are the safety concerns, but I completely agree. We give up less here. So if you define safety in terms of your vulnerability as a citizen there, that could subject you to greater harms.

If you are publicly shamed or you go against the norm in China or you don't find yourself integrated those systems, it can make you more of an outlier and that can have consequences that could be defined around safety, which beg for another panel discussion when it comes to that. But you know --

MR. GORDON: If I could just offer one very brief final reaction to your question. I think that one word that hasn't come up in our conversation, but probably should is the word Xinjiang.

MR. WEST: What's the word?

MR. GORDON: Xinjiang okay. The area --

MR. WEST: Can you tell us what the hell --

MR. GORDON: -- of western China where the weaker Muslim population majority. And where facial recognition technology is being used in very invasive ways that from a American perspective would seem to violate their individual rights and liberties. So there are big ethical questions that both United States and China are grappling with and coming perhaps out in different directions on and I don't think that there'll be reconciled anytime soon, but it's worth, I think all of our considering the fact that we are reaching different conclusions on some fundamental questions about the use of artificial intelligence technology.

The final thought is that I hope we can continue this conversation in the future talking about the premise of your second question, which was does the Chinese system advantage it in competition with the United States and the democratic model in terms

of advancement of artificial intelligence technology? It's an issue that I think some of us here have been debating. It's an unresolved debate. It's an important debate and I hope it's one that we can continue.

MR. WEST: Okay. On that note, I want to thank our panelists Nicol, Robb and Ryan for sharing your thoughts. Very thoughtful and thank you for coming out.

(Applause)

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