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# THE FUTURE OF WORK: ROBOTS, AI, AND AUTOMATION

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P R O C E E D I N G S

MR. WEST: Good morning. I'm Darrell West, vice president of Governance Studies and director of the Center for Technology Innovation at the Brookings Institution. And we appreciate you taking time to come out today.

So this morning we are launching my new book, "The Future of Work: Robots, AI, and Automation." And we will be selling copies of the book out in the hallway after the event, so feel free to pick up a copy. And for those of you who are on the webcast audience the book is available on Amazon. If any of you would like to post comments during our discussion we have set up a Twitter hashtag, #FutureOfWork. That's #FutureOfWork.

So I wrote this book to examine the impact of robots, artificial intelligence, and automation on the workforce, education, public policy, and politics. But the book is about much more than just the technology revolution that is transforming our world. It's about the broader structural changes that are taking place in our economy and in our political system and the shifts in our business models. So we need to focus on the joint impacts of technology and business models because that's what's producing the economic anxiety and giving us populist-style politicians.

In the book I argue that Trumpism is going to outlast Trump. And I suggest that we have to manage things carefully so we don't end up over the next 30 years with Trumpism on steroids.

So let me start by reviewing some of the emerging developments in terms of technology. So we are seeing robots engaged in restaurant food delivery. In my neighborhood, in the U Street area of Washington, D.C., there are automated delivery systems for takeout food.

When I was in Moscow I met this woman, and I know that sounds like an opening line in Donald Trump's memoir. (Laughter) Many of you are familiar with Alexa, the digital personal assistant that's starting to transform people's day-to-day activities.

Of course, we all know about driverless cars. Uber has ordered 24,000 of

these for delivery starting next year. In China, they're doing exactly the same thing.

In the Washington Harbor area here in D.C., this security robot armed with video cameras patrols the grounds. The video feeds goes back to security people and this allows them to monitor a number of different areas.

Now, if you're interested in kinky gadgets, this is Harmony. She's an interactive sex robot and she's available in 1 of 12 different personalities, so you can choose what you want there.

But my personal favorite is this dog robot. Oh, except for the banana peel. It fell there on the peel. And by the way, you know, 50 or 100 years from now when robots take over and enslave us, this video is going to be reason. Like they're going to look back and wonder what was our species thinking about that we would put a banana peel right in front of the robot?

The New York Times recently had a cartoon envisioning the factory of the future. And you can see here that, according to their formulation, the factory is going to have one human being standing at a console surrounded by a bunch of robots engaging in the production activities.

The Wall Street Journal, though, has a different view of the future workplace. Here robots are goofing off at work watching cat videos. Here's one caught in the act and that robot looks very guilty.

But I think the big question everyone wants answered is just the impact on the workforce, so this is the topic that has attracted the most attention. People are worried about the workforce consequences. There actually have been five very detailed empirical studies of the workforce impact. And as I show here on this chart, they range from a 14 percent impact up to a 54 percent impact, so hints there clearly is a wide range here. The Bruegel think tank from Europe has the highest estimate in terms of the highest impact on workers at 54 percent, followed by researchers at Oxford University. Mackenzie has a couple versions and the OECD came in at a 14 percent impact.

But economist Larry Summers last year issued his own forecast, and he predicted that a third of men between the ages of 25 to 54, the so-called prime age men of the part of the workforce, will not be working by the year 2050. Now, this probably sounds farfetched to a lot of people, but we're already at a 12 percent level in terms of prime age men outside of the workforce.

So this chart shows how the trend has emerged from in 1948, 98 percent of the prime age men actually were in the workforce and were working. That number has dropped steadily over this last 60- to 70-year period, so that it's now down to 88 percent. And so the 12 percent number, basically what Summers did was project the current trends and add kind of more of an impact in terms of what is going on with technology.

But obviously, not every sector is going to be equally impacted by technology. The Pew Research Center recently did a survey looking at people's views about the impact on different sectors. And it's interesting, there were three sectors that they viewed as being the prime area in terms of workforce impact, areas likely to suffer the greatest losses. These included the hospitality industry at 42 percent and the retail and finance sectors at 41 percent.

At the low ends of the spectrum in terms of sectors not likely to be experiencing that great of a loss were healthcare and education. And, of course, those sectors traditionally have been very slow to innovate and so, hence, the tech impact is likely to be more restrained there.

But it's not just sector differences. There also are going to be differences across parts of our society. Here I have broken down the unemployment rate by different groups within society. So if you look at whites, their unemployment rate right now is about 3.7 percent; for women in general, 4.3 percent; young people it jumps to 14.7 percent; young African Americans it's 25.9 percent; young, male African Americans already have a 33 percent unemployment rate.

So if you take the lowest workforce impact, the one from OECD where they

argue that 14 percent of the workforce was going to be negatively affected by technology, and just add it on to the current level, you quickly end up with a situation where young, black men are likely to have a 50 percent unemployment. And that, my friends, is a catastrophe.

So the story that I tell in the book is basically not just a change in the technology, but major shifts in the business models. So one of the things I did was to go back to the 1960s and look at the largest firms, the two biggest companies in America in 1962 were AT&T and General Motors. And I look at the market capitalization and the size of their workforce.

So AT&T had about a $20 billion market cap. And by the way, that's adjusted for current dollars. And they had 564,000 employees. General Motors was a $12 billion company and they had over 600,000 employees.

Now let's contrast that with some of the largest companies today: Apple, Google, Microsoft, and Facebook. And these are 2017 numbers.

So Apple, as of that point, was an $800 billion company. Now it's actually closer to a trillion dollars, but it only had 116,000 employees. So comparing it to AT&T in 1962, the company was 40 times as valuable with only one-fifth the size of the workforce.

Google, it's a similar story. They have 74,000 employees; Microsoft, 114,000 employees. Facebook only has about 19,000. Now I think it's up to about 20,000. So contemporary companies have discovered because of the scalability of Internet platforms, you don't need a lot of workers to become a very large and successful company.

And, of course, the reason why that is happening are major changes in the business models. The emergence of the so-called sharing economy, also known as the gig economy, relying on outsourcing, temporary workers, jobs without benefits, lean management techniques. Software allows you to scale up dramatically. And so companies no longer have the same need for full-time employees with benefits. Many young people today who I know have two to three jobs at the same time. They're always part-time jobs with none providing healthcare or retirement benefits.

So today we're pretty much at a juncture where we're kind of at the edge of heading towards either dystopia or utopia. And I think you can understand given the things I've mentioned so far why some people argue that we're heading towards dystopia. They look at the high unemployment rate among certain aspects of our society, the high levels of income inequality, the reliance on jobs without benefits.

But we also should be aware there's a possibility of utopia over the next 30 years. Utopia would basically feature greater leisure time, so people can pursue their outside interests, their hobbies, art, culture, music, theater, whatever it turns out to be. We would move towards being a more inclusive society and that most people will end up being much better off.

The crucial variable I argue in my book is how we respond to the technology changes and the shifts in the business models. It really matters a lot in terms of how government responds, how the business community responds, and how our system of education responds. I argue we control our own destiny here. We are not doomed either for dystopic or we are not guaranteed a utopia. It's the choices that we make that will decide the future that actually develops.

There are lots of things that we can, and in the book I outline a number of these in greater detail. But, for example, we can reimagine the nature of jobs. For example, we could cut the work week to 30 hours and employ more people in the process. We could redefine jobs in the sense of including things like parenting that everybody recognizes if very valuable for society. Every study that has ever looked at parenting argues that is one of the most important factors in terms of how people turn out. The United States is the only major developed country without paid family leave, so that would be an easy thing that would help.

But we could also go further. For example, the United Kingdom currently provides credits for social benefits through volunteer work. In the United States in order to qualify for Social Security or other benefit systems you have to have worked and a certain number of quarters of work over the course of your lifetime. The United Kingdom has

argued that volunteering is a socially useful good for the entire society and that you can quality for social benefits by engaging in volunteer activity.

We also need to rethink education. Today we basically invest in education for people up to about age 25, and then after that you're pretty much on your own. In a world of great technology innovation there are going to be jobs created that we don't even know exist today. There are going to be job skills required that many of us don't have right now. People are going to have to periodically upgrade their job skills, and this can mean online courses, certificate programs. Schools need to change their curriculum so that students have the skills needed in the 21st century economy.

We need to make it easier for people to change occupations. Like if you want to move from the factory because perhaps you've been laid off or replaced by automation and you want to become an electrician or a plumber, we need to ease some of the job licensing requirements that currently make it very difficult for people to make those types of transitions.

But we also need to reinvent our social contract. We need to think about ways to separate benefits from jobs. We need to develop citizen learning accounts so that people can invest in their account and then when they need to acquire a new skill, they need to get a different kind of education, they have the resources to pay for it.

In terms of people who might be left behind, there are currently existing programs, like the Earned Income Tax Credit, that works very well. It has a very strong record of performance that can help people during this 30-year time period in which we have been going through a major transition.

Some people suggested even more radical reforms, such as a basic income. But I want to point out there is a liberal version of the basic income and a conservative version. The liberal version is people basically keep most of their current social benefits and they get $2,000 a month on top of that. The conservative version is you don't get to keep the current social benefits, that you get $2,000 a month and you buy the

healthcare you want and the retirement savings that you're willing to invest in. So when people tell you they're in favor of the basic income you should ask them which version, because they are -- they actually should not be called the same thing because they are completely different versions.

And then, of course, the question of who's going to pay for all these things looms large.

Is our politics today up to the task of actually helping manage the transition that is coming? There's certainly going to be many new jobs that are created through technology. Anything involving data is guaranteed, but we need people with design skills, as well, people who can translate technical language into language the rest of us can understand.

But the problem we face today is we have a bad combination of political polarization on the one hand combined with economic anxiety on the other, and that is what gives us Trumpism on steroids. And that's the thing that we really have to worry about in this period from 2020 to 2050 as the technology innovation accelerates.

So in the book I argue that Trumpism is actually not an aberration; that the economic and social anxiety that he identified so clearly during the course of the campaign is likely to increase in the coming decades as the transition starts to kick in. And in that situation people will look for scapegoats in order to blame for their anxiety.

If anything, candidate Trump actually underestimated the nature of the problem because his diagnosis of our economic maladies was the loss of manufacturing jobs to China and bad trade deals. The problem actually is much bigger than that because it's the combined impacts of automation and the shifts in the business models and the impact of those things on people's ability to get income as well as qualify for social benefits. That is really a much bigger problem.

And then at the same time, we have a big problem in terms of geographic inequities. My Metro colleagues, Mark Muro and Sifan Liu, did a very interesting research

project right after the 2016 election in which they found 15 percent of U.S. counties generate about 64 percent of gross domestic product. This disparity, of course, is what helped elect Trump because all of those areas in between of the two coasts, where much of the economic prosperity is concentrated, is not doing well, has not been doing well. They feel left behind, they're angry, they're upset. And Trump came along to provide them with a vehicle for their anger.

I argue this is not the first time America has handled a major transition. If you go back 100 years ago and look at the period from the 1890s through the 1930s, we had an equally fundamental shift from an agrarian to an industrial economy. It took decades to work through those changes, but think about what we did in that time period, which eventually positioned America for global leadership, victory in World War II, and extensive prosperity in the post-war period.

During this time period, we adopted new social programs. Social Security dates back to that era; the notion of unemployment insurance. There was concern about monopolies and so they broke up the railroads and Standard Oil. We added an income tax to our country in the form of a constitutional amendment.

At the same time, it was not just economic reforms, but we did a series of political reforms. We expanded the electorate. Women earned the right to vote during this time period. We developed the notion of primaries and referenda to break the power of the party bosses, who were considered to be quite corrupt at that period. We added a constitutional amendment to allow direct election of senators.

So today, I argue we need an equally fundamental set of reforms. We need to abolish the Electoral College because we may end up soon in a situation where the prosperous areas in America have 30 senators and the not very prosperous areas have 70 senators. That is a recipe for political disaster.

The Electoral College is relevant because we've already had two elections in which there was a disparity between the popular vote and the Electoral College. With our

system of geographic representation combined with the geographic inequities that exist across America, we may end up in a situation in which every presidential election has an outcome similar to 2016: somebody winning the Electoral College, but not winning the popular vote. That, if that happens all the time, is going to be a constitutional crisis for America.

So we need to kind of rethink voting. We are thinking about the concept of universal voting, kind of the Australian system, where everybody has to vote. If you don't it's just a $25 fine. It's like a traffic find. But Australia gets 90 to 95 percent of people voting.

That's important because one of the drivers of political polarization today is the fact that in a relatively low turnout election, both parties have an interest to play to the base. Universal voting will help eliminate those types of negative incentives.

But the biggest challenge that we face is actually cultural in nature. It's not economic nor is it even political and institutional. It's cultural in the sense of how American navigates this issue of personal versus social attributions of responsibility. Personal attributions of responsibility basically say people are responsible for their own outcomes in life.

Like some of you are going to do very well. You know, you're going to get data skills and you're going to get good jobs, you're going to make a lot of money, and you're going to feel very prosperous. Others are not going to do so well and they're going to be left behind.

In a society based on personal attributions it's like it's the responsibility of you yourselves to end up with a good outcome.

The alternative formulation is a society based more on social responsibility where we're responsible for each other and that we help each other in the process. And if you don't have a job or if you don't have healthcare benefits or if you don't have enough money to have a good retirement, I am going to help you. But then the question in that situation is, am I going to be willing to give up 20 percent of my income or 30 percent of my

income or 40 percent of my income, whatever's required to support you?

I can't predict how we're going to answer that question because when you look through the 200+ years of American history, it's filled with both responses. There are sometimes where we have leaned towards personal responsibility. There are other times where we have accepted social responsibility. And I'm going to argue, and I'll close the talk with this, the way we answer that question largely will determine whether in 2050 we end up in utopia or dystopia.

Thank you very much. (Applause)

What I'd like to do is to invite our two panelists to come up on the stage and we will continue the conversation.

Okay, so to provide their own perspective on the future I'm very pleased to welcome two distinguished experts. Molly Kinder is senior advisor for a project on Work, Workers, and Technology at the New America Foundation. She's also the director and professor of practice at the Beeck Center for Innovation Venture at Georgetown University. Molly has more than 15 years of experience in innovation, social justice, and international development. She has served as vice president of the Global Innovation Fund. And she also worked for the Obama administration as director of special programs at USAID.

Also with us is Tracy Zuckerman Van Grack. She is the senior vice president of communications and public policy at Revolution. This is a D.C.-based firm that invests in disruptive and innovative companies. Prior to that position she was director of the Brunswick Group, a global communication consulting firm. And she also has worked in the Office of Corporation Engagement at Goldman Sachs, where she led strategic partnerships with outside organizations.

So I'll start with Molly. So you focus on work and workers at New America, so why don't you tell us about the workforce trends that you see developing and how they affect employees?

MS. KINDER: Great. Thanks, Darrell. Well, first I just want to say it's an

honor to be here at Brookings. And for those you who have not yet had the chance to read Darrell's book, I highly recommend you do it in full. I thought it was an absolutely spectacular book, very comprehensive, and left you with a lot of really good food for thought about what we could do in the future.

So at New America and also at Georgetown I'm focusing on how technology is changing work, and there's three big trends that we're seeing now and we project out to grow even in the future: opportunity, change, and risk. And Darrell covered a lot of this in his book.

First, there's no question that technology creates really exciting new opportunity to when it comes to work. In fact, there are some great researchers at MIT that found that in the three decades since 1980, about half of all job growth came from brand-new job titles. We can think of a lot of jobs today that didn't exist just 10 or 20 years ago. Data analysts, which is a position that Darrell was referencing, there's well over 2 million data analyst positions now in America. That's projected to grow considerably in the future and a lot of those pay in the six figures.

So when we think about how artificial intelligence and the technologies that Darrell writes about in his book, there's no question that they're create exciting, brand new opportunities we can't even conceive of now and that the main trend of those jobs is they are typically requiring a great deal of education and skills.

What we expect to see if that for those who are able to seize that opportunity from technology it matters a lot your education, your skills, your adaptability, and, frankly, also your ZIP Code. So there's a big question of who actually is going to be able to seize that opportunity.

The second big trend we're seeing with technology in the workforce is change. And there's no question that technology has started to disrupt, but we'll see a lot more disruption across so many different occupations, from construction to retail, to medicine and law. There are very few career fields that won't be touched in some by

technological change.

For some workers that's going to mean more work with the technology. So you can imagine a radiologist who's going to have to learn how to work with technology that's going to be part and parcel of their day-to-day lives.

For other people, counterintuitively technology is going to mean less -- more work with people. And we often think about it often on these panels. Somebody tells a story of the ATM machine and what its impact was on tellers. So when the ATMs were introduced, everyone was fearful that the teller job was going to disappear entirely. Actually what we saw was that the teller job changed from a lot of routine work of processing checks and dealing with cash to actually a much more higher value-added, customer-oriented, customer service-oriented position.

So for some people their job is actually going to pivot to a higher skilled and more person-facing job. And for a lot of people, frankly, technology's going to take some of the drudgery out of the work and make them even more productive in ways that I think are going to be very exciting.

However, taken together, change for a lot of people can be a big discombobulating. Looking out into the future the idea that you have a certain skill set or an occupation or a stable career is really more and more a thing of the past. The half-life of our skills is shortening and we expect a lot of people to have to constantly up-skill, relearn, and maybe even switch jobs.

And finally, there's definitely risk and I think that's maybe why some of you are here, is this worry about what's going to happen in terms of displacement of jobs? And certainly this into the first time that technology might have a negative impact on specific occupations. And I think for the risk side manufacturing tells a story that we'll see across lots of different occupations.

So since 2000, there are 5 million fewer manufacturing jobs. And the bulk of those job losses are in routine, lower-skilled positions. There's actually been an increase

in the manufacturing jobs that require higher education, for instance a graduate degree. Those sort of more routine, welding, putting machinery together that does not require advance education, that is what has really gone away. And when we look out into the future we're familiar with that with manufacturing, but really the biggest trend of who's going to be most negatively impacted by technology and automation is really lower-skilled workers in other sectors. So think fast food waitresses and food preparers, cashiers, retail salespeople, a lot of very young, low-skilled jobs that don't require any preparation in advance.

There's another cluster of occupations that I also worry about that are older, primarily women, working in back-office functions. So think folks who work in sort of HR departments and payroll, administrative assistants, sort of clerical work. That's very high risk of automation, and those are primarily female positions and older. So from that perspective the real trends we're seeing in terms of risk of displacement is highly correlated to low wage, low skilled, and low education, and routine work.

And that poses a big challenge because, in fact, a lot of the occupations that are similar, if you're a young person with a high school degree, a lot of the same jobs you might apply for are similarly at high risk for automation. So there is a big question of what's going to fill those roles and how do you up-skill those workers to be eligible for some of the exciting opportunity.

Everyone wants to know are we facing a future with less jobs or more jobs? It's hard for us -- anyone who predicts the answer is guessing. How much the job creation will be offset by the job losses is really everyone's guess. Even if you assume on that we're the same, there's huge distributional questions and questions of disruption and change. And, frankly, we're not prepared yet. There's no city, there's no state, there's, frankly, no country around the world that yet has the policies and the programs in place to help workers adjust to these changes and make sure they're prepared for the opportunity.

MR. WEST: Thank you. So, Tracy, Molly mentioned the importance of the

ZIP Code and I think that leads into some of the things that you've been working on. So we talked earlier about the danger of geographic inequities and how much of our current investment is taking place on the coasts and not in the areas in between.

One of the signature initiatives at Revolution and its founder, Steve Case, has been the Rise of the Rest Tour that seeks to promote investment in Midwest, South, and Rocky Mountain areas. And I know you just came back from a tour last week of Dallas, Memphis, Birmingham, Chattanooga, and Louisville, five days and five cities. These tours identify promising startups that can help build prosperity in those areas.

So can you tell us a little bit about the Rise of the Rest and what you are trying to do with it?

MS. VAN GRACK: Sure. Well, first I'd like to second Molly's recommendation for Darrell's book. It really is just an incredibly comprehensive roadmap, I think, to the challenges that we're facing. And I would also just like to say that I think, you know, on behalf of Rise of the Rest, we're really honored to be included as a potential or really partial solution to some of the issues around geographic inequities.

You know, as Darrell mentioned, I'm just back from quite a tour, so you'll have to forgive me if I'm a little tired, but I'm also quite energized I think by everything that we've seen across the country. And we always come back, I think, with a really probably more positive or optimistic outlook than others when they're talking about innovation and entrepreneurship that's happening throughout the country.

So I'll back up a little for those of you that aren't familiar with Rise of the Rest. Revolution, as Darrell noted, was founded in 2005 by AOL co-founder Steve Case. And we've always been committed since our founding to investing in companies between the coasts. It's our investment philosophy that great companies can start anywhere. We've invested more than a billion dollars in capital in companies that are outside of Silicon Valley.

And then at around 2014, Steve started to see that, you know, although we were seeing really exciting things and he was traveling as part of the Startup America

partnership during the Obama administration, really exciting, innovative things that were happening in communities between the coasts, other investors really weren't seeing that. And so as part of an effort to encourage regional investment, to encourage investors on the coasts to start looking at investment opportunities in the middle of the country, we started something called the Rise of the Rest Bus Tour.

And so since 2014, we have literally been getting out of our office and on to a bus and traveling to start up ecosystems and entrepreneurship communities between the coasts. We've been to 38 cities as of last Friday. We've traveled more than 10,000 miles on a bus. And it really is, you know, if you can imagine it, a campaign-style bus. We go through communities and we really take a full day to try and understand what's happening in every facet of that ecosystem.

So we meet with elected officials, university leaders, everyone that is really part of building companies, whether it's founders or employees, individuals that are leading coding academies and boot camps, really touching on every aspect of that community. And then at the end of the day we host a pitch competition where we invest $100,000 in a local startup.

And the second part of the Rise of the Rest story is, as of last year, we launched a fund that was backed by a number of really iconic and extraordinary entrepreneurs and investors, everyone from Jeff Bezos, Sheila Johnson, Tory Burch, Henry Kravis, Ray Dalio -- really just an incredible group of people that really symbolically were committing to this idea of saying, yes, we believe that there are great investments, there are great founders, great entrepreneurs, and exciting things happening in cities outside of Silicon Valley.

And, you know, I mean the geographic inequity problem is real from an investment perspective and the data is pretty sobering. Seventy-five percent of all venture capital last year, according to NVCA, went to three states: California, Massachusetts, and New York. And 50 percent alone went to California. You can probably imagine, you know,

out of that 50 percent where the majority of that percentage went, right? To Silicon Valley and Northern California. So when we're looking at discussing populations that feel very much left behind by this giant leap forward in technology and innovation that we celebrate on the coasts, right, you have an extraordinarily large group of people that feel that it's not only killing their jobs, but we're not investing in the next wave of companies or employment opportunities the same way we are when we look at the technology ecosystems on the coasts.

So Rise of the Rest is really an effort to shine a spotlight on that problem and possible solutions.

MR. WEST: So I'm going to ask one more question of each of our panelists, then we'll open the floor to any questions or comments from you.

So, Molly, I know New America has kicked off a new effort called Shift Labs. And you've had events in Phoenix. You're going to Detroit and Indianapolis. These are daylong community-designed discussions that bring together leaders to discuss how automation will impact job and, probably more importantly, how local communities can respond to those possible changes.

So can you tell us what kind of response you're getting and what you hope to accomplish there?

MS. KINDER: Great. Thanks, Darrell. So yeah, we just kicked off Shift Labs with support from the Rockefeller Foundation a few weeks ago in Phoenix, and we're heading later this week to Indianapolis and we'll be going to other U.S. cities throughout the summer and the fall. And really the purpose is to take this conversation we're having here in Washington, but down to the local level, to take all the best data that we have about how occupations will change by, say, 2030 because of automation and translate that to what's happening at the local level.

So I did some analysis to take that national picture and map out for Phoenix what percent of jobs are at risk, who are those people, what are the trends from gender to

education, to different sectors, and then use that to start a conversation with leaders from community leaders to employers, the mayor's office, technologists; take a daylong sort of community day to really dig into that. And we did a lot of human-centered design where we had each table had a different persona of a major occupational group locally that's going to be changed by automation. What's the best-case scenario? What's the worst-case scenario? And what do we need to do along the way to empower that person to connect to opportunity.

And from that the community themselves are able to back out, okay, well, what are some priorities? So not surprisingly for Phoenix, a big priority is education. There's just no question that automation is going to most negatively impact those who don't have a postsecondary credential. And there's a huge question of how do we make sure more and more young people are having a foundational level of education that's going to allow them to weather these changes and connect to opportunity.

Similar to the Rise of the Rest Tour there's a big push on how do you make sure there's support for entrepreneurship. If you're a grounds keeper and you're a landscaper and your jobs potentially may be automated, how can that person switch to opening up their own small business, for instance?

And then, of course, training, sort of being in the middle of your career, for instance, and having a busy family life, you're busy in a job. You're going to need to up-skill. And the truth is our higher education is just not designed for the needs of busy working adults. So we had a lot of discussion about what that might look like, particularly to help finance. I mean, half of Americans can't afford a $400 unexpected expensive and we're going to be asking them to invest real money in retraining and reskilling. So how do you help people have a sense of security and stability while they're reinventing themselves in education?

So it was a great discussion. We had a huge amount of enthusiasm and a real shared sense of commitment to doing something. So that was our first event in Phoenix

and we'll be going to other cities.

But one of our big takeaways is that these big sort of national conversations really need to be translated into local realities, real data that's going to impact local, and experimentation. Because the truth is even in this room we can't say we have all the answers. And the front lines of a lot of these changes will be in communities and cities, not just here in this country, but elsewhere. So we're really excited to keep this conversation going.

MR. WEST: So one more question for Tracy, then we can hear from you. So, Tracy, I like your focus on startups because we know that small businesses create many of the jobs in America. We know that many of the large technology firms -- Apple, Microsoft, Facebook, and others -- started either in garages or dorm rooms. How should we be encouraging the startup economy, either in terms of policy changes, financing, engaging young people, and on?

MS. VAN GRACK: Yeah, sure. So, you know, just to reiterate that point, I think oftentimes government officials confuse small businesses and startups. And startups are really the high-growth companies that are responsible for most job creation. I think the statistic is gazelles, which are the top 1 percent of startups, are roughly responsible for about 40 percent of job creation each year, which is pretty extraordinary when you think about it. And from that perspective we should really be doing everything we can from a policy angle to really encourage startup growth. And, you know, policy is obviously a tool or a lever that we talk about quite a lot on Rise of the Rest.

And you noted sort of or alluded to the political dysfunction or paralysis right now. You know, we have seen a couple of things at the federal level. We were talking before the panel about opportunity zones, which was part of the last tax reform bill. And that is literally an opportunity for investors to reinvest unrealized capital gains in distressed communities, so I think that will be a really interesting test case to see whether we can incentivize further investment in innovation across the country.

But where I see the real exciting developments coming from is really from a state and local level. So as we travel the country, as I mentioned, we really try and touch with elected officials in these communities to better understand what they're doing to encourage innovation. So if they can't look to federal policy, what can they do to really seed a startup ecosystem? And there are some really interested examples everywhere.

You know, Arizona actually just launched a fintech sandbox, which is something that the U.K. has, Singapore has. We have not been able to pass federal legislation to have that type of entity in the U.S., but Arizona passed it and they want to encourage fintech companies to really develop their technologies in their state. Now, it will be very difficult for them to do that at the state level, but if they can encourage other states to do the same, perhaps there can be a broader network of states that can leverage something like that, and maybe it will encourage the federal government to centralize that type of regulation.

You know, Darrell mentioned I just came from Chattanooga. Chattanooga was approached by VW to build an advanced manufacturing plant, but they didn't have the connectivity that was required to build that type of plant. And because they are located in something called Tornado Alley, they needed to have really secure connections in order to build that type of plant. So instead of looking to the telecom companies, they decided to do it no their own. And as a result, not only did the build the plant, but they have become a hub really in the Southeast for innovation. So you're seeing things like that.

The other thing I talk about, you know, we talk about a lot with Silicon Valley that one of the most interesting things or one of the things that keeps their ecosystem churning is this idea of network density. And you can't walk out of coffee shop in Palo Alto without running into someone that could be a potential investor or a partner or someone who's going to refer a new CTO to you. And that's really just not the case in other cities.

And so a lot of economic development offices have partnered, whether it's with universities or corporations, to institute places that can build that network density,

whether it's a co-working space, an incubator, an accelerator, these communities that really engender communication between individuals that are in the entrepreneurial community. And in Phoenix, it's the warehouse district. In Chattanooga, it's the innovation district. But it's really this idea of can we create a concentration or a density of individuals that are willing to support each other in creating these burgeoning ecosystems?

MR. WEST: Okay, terrific. Let's open the floor to any questions. We have a microphone back there. There's a gentleman over here who has his hand up and the microphone is coming over to you. And if you can give us your name and organization.

MR. FINNERAN: Kevin Finneran at the National Academy of Sciences. Darrell, when you had the division between personal responsibility and social responsibility it seems to me there's also a very large business responsibility. And Tracy talked a little bit about entrepreneurship and new startups. But what about the existing companies which are complaining about the lack of trained workers and yet not investing in training themselves, and also hiring more people in gig relationships, non-health benefit relationships who are not only not preparing people for better jobs or hiring people into worse or, you know, less skilled and less rewarding jobs? Is there any way that we can get this community of existing businesses where the jobs are now to do more?

MR. WEST: I hope so because that certainly has to be part of the solution. It's not just a government issue, it's how businesses as well as educational systems respond. Because I think the big challenge going forward, it's not that new jobs aren't going to be created. There certainly are going to be new types of jobs developed over the next few decades. The problem is going to be mismatch between the skills needed to do those jobs and the skills that many current American workers have or actually do not have.

And so that is the reason why there are a lot of businesses who are starting to invest in their own worker retraining programs for exactly that reason. But schools have a responsibility to redo their curriculum, to kind of think about how they can prepare workers to handle this transition. I think community colleges are going to be a big part of this story

because a lot of the people who are going to be hurt in those entry level jobs are going -- they're not going to be going to four-year schools to address their skill needs. They're going to be going to their local community college.

Do either of you want to comment on that?

MS. VAN GRACK: Yeah. I mean, I'd just add I think you hit the nail on the head in terms of looking at startup ecosystems between the coasts. You know, the majority of Fortune 500 companies are not located on the coasts where we find these startup ecosystems kind of growing every day. And so for us, it's really how do we talk to the corporate community and how do we get them to partner with startups? Because if you're a startup in any one of these communities, having a corporate partner or being a customer of a corporate will give you enormous validity and credibility moving forward.

And I think for a long time you really saw this stark divide between the corporate community and the startup community in a lot of these cities. And that's starting to change and I think that's largely because corporations are seeing, A, the benefit of talent pipeline from startup companies, whether they succeed or fail. I think they're starting to see the benefit of having an inside track on new technologies perhaps for a potential partnership or acquisition down the road. And so we are starting to see in a number of communities the corporate community working a lot closer with startups, both to kind of create this larger innovation ecosystem so that they can more easily recruit and retain talent from other places, but, again, also so they can build their business into the next wave.

MS. KINDER: And I would just add as we look it, I think every point you made is really valid and there's big questions right now about what's the role of businesses and employers in the skills gap and in workforce policy. I think as we look out into the future and we look out and imagine more automation, artificial intelligence really hasn't yet impacted that many businesses, but it will in the next 10 to 20 years. I don't think we yet have a sense of what's the best practice for an employer who will automate parts of their workforce. What's the responsibility? What training will help them prepare for another job

works? How do they absorb some of them into their workforce? There's big questions just in the same way that I think we're still figuring out the policy side. I think from the business side there's still more that has to be done.

One thing we're doing at New America is doing some user-centered research to work with workers to better understand what they think their needs are, their opportunities, what they would like to see. And then work with employers to pilot some new solutions.

But I think you're absolutely right. And the most effective responses typically involve the employers with the public sector and civil society.

MR. WEST: The gentleman right here.

MR. DILLON: I'm Ken Dillon. I teach at Marymount University. I try to explain to my students who are heavily into digital technology that it would be very good for them to take a philosophy of ambidextrous education as their ideal and try to find ways to learn things through means other than digital. For instance, in my class I emphasize debates.

And I'm wondering is it realistic to take this idea of ambidextrous education into the workplace and say ambidextrous workplace. Clearly there are places such as the factory, most factories, where it doesn't make sense, but maybe there are some places which now are, without much thought, being digitized, but maybe could operate given the right incentives as a real-world kind of workplace. In other words, one with minimum digital input.

MR. WEST: Any response?

MS. KINDER: I mean, I think you're raising a good point. I think there's a sense that the future means everything is technology or everything is digital, whether it's an education, should everyone get STEM and digital skills or not? And I think there's a lot that technology's bad at, and those are very human things. So I don't think the response to the rise of machines is to necessarily always be like a machine, but it's actually to be more

human and that's, in some ways, how we're going to prevail.

So there's actually a move in a lot of different countries not just on STEM and digital skills, but actually in creativity and in people skills, interpersonal skills. China, for instance, is trying to introduce creativity into the curriculum. Korea has done a big push, South Korea, on soft skills. Ottawa has some really interesting things about 21st century skills that are not all about technology.

So I think this notion of sort of what is it to be human in a world of machines, both from a learning point of view and how as a species we're going to be so successful in the workplace, I don't think that everything is digital. I think that -- and some of Darrell's colleagues here, Mark Muro has some excellent research of the digitalization of the U.S. workforce and I fully believe those statistics. So digital skills are required in places we never expected, but that doesn't mean that we don't also need human skills and philosophy and teamwork and creativity and whatnot.

I probably didn't answer your question, but it inspired some more musings.

MR. WEST: Okay, thank you. There's a woman right there who has a question with her hand up. Yeah, right there, yeah.

MS. HEGEWISCH: Hi, my name is Ariane Hegewisch from the Institute for Women's Policy Research. And we are trying to capture the future of work discussion from the point of view of women.

Yesterday was Mother's Day, and if you look at women make more efforts to get education, so they end up in more debt and often with degrees that don't give them a lot. And that lack of information and signposting and completion is particularly bad for mothers and single mothers.

So I was just wondering whether across the states you have come across some examples where there is better signposting, how much access to information about what education you should get is kind of in the process, maybe through new technology, and the thoughts about making this less debtful and affordable.

MS. VAN GRACK: Yeah. Well, you know, from the venture capital perspective, again, the numbers are quite sobering. Only 10 percent of venture capital goes to women, so not surprisingly it matters. It not only matters where you are, it matters what you look like in terms of obtaining investment. And obviously, you know, it's a pretty salient conversation right now in the venture capital or investment community as to how to encourage more female founders to get investment and to be able to grow their business.

And, you know, from our perspective it really is kind of both a supply and demand issue. And on the supply side you see sort of at an early stage, both as a result of gender dynamics and gender norms, less women sort of moving towards STEM education, moving towards engineering degrees. And the truth is the majority of individuals that are starting or pushing early-stage startups are men with engineering backgrounds. And then, you know, with very few early analyzable business metrics, investors are generally relying, implicitly or explicitly, on subjective biases and funding people that look like them.

So I think, you know, there's a variety of things that need to come into play. A, obviously, it's the education piece. And I think that will be a combination of changes in policy and cultural norms. But, B, also, investors need to be more intentional and more deliberate about the investments that they're making, the communities that they're reaching out to, and also elevating women to positions of venture partner to be able to make some of those investment decisions, so that they're looking for companies that would resonate with them.

You know, when we go to these cities on the tour, we're pretty deliberate about making sure that we reach out to an extraordinary number of organizations. And I think we really felt that just by getting out of the Silicon Valley bubble that we would naturally find more entrepreneurs coming from different backgrounds. And I'm pleased to say that that actually has been the case. So I think a large part of this is sort of getting out of your own community, getting out of your own bubble.

On this last tour, you know, we had four African American founders and two

females, which is just, I think, a testament to the idea that if you get out of your own bubble, again, and start looking kind of in a broader sense, you will find that there are really a phenomenal number of different types of people creating different types of ideas.

MS. KINDER: I have two really quick. First, it's great that you're looking at gender. Our research at New America suggests that women are actually at higher risk than men from automation, which is not what you would gather from any media story. If you Google "AI" and "job" or "robot" and "job," almost every single Google image is of a man. Factory floor, a driver, those are the images that come to head. It's actually not true. It's actually women who are at higher risk.

There are other factors that might countervail that in that care jobs are going to be on the rise, which tend to be women. But women are at risk and no one's talking about that. And I think one of the things we want to do at New America is look through our qualitative research and quantitative research with occupational groups that are predominantly women at risk, to understand better do they have unique needs in retraining and stability and various things?

Your other question, which is spot-on, is I actually think one of the most exciting areas in the solution space to the future of work is this idea of information that better connects people to careers and information about skills. Colorado has a really interesting program that's a partnership between LinkedIn, the Marco Foundation, and the state that has all sorts of online information about careers, apprenticeships. They have a lot of innovations around Coaching Corps.

So that's just the beginning, but there's definitely a lot of momentum. And, in fact, some of it uses artificial intelligence and technology, but I'd be happy to talk more.

MR. WEST: And if I can add just one quick footnote to that question. Women certainly are going to be at risk as automation kicks in just because they occupy many of the entry level jobs. But next week, we're actually putting out a national survey on attitudes towards artificial intelligence. And just to give you one quick preview, there is a

gender gap, but it's in the direction of men are more worried about artificial intelligence than women. It's not a big gender gap, but there is that difference.

In the very back, I think we have time just for one last question.

MR. ALDEN: Thanks very much. Ted Alden from the Council on Foreign Relations. We heard a lot this morning, which you often do in these discussions, about a lot of really interesting stuff going on at state and local levels, some companies doing very interesting things, and then complete paralysis, as Darrell pointed out, at the federal level.

I want to ask each of you maybe to put a percentage on it. How much of this problem can be solved through state, local, private, NGO action and how much requires addressing the political challenges that Darrell laid out? You know, can we do 10 percent, 20 percent, 90? How far can we get without positive action from Washington?

MR. WEST: I would say in terms of the political challenges and the fundamental governance problems that are going to prevent us from really solving this problem, must of that is at the national level. Because the types of policy responses and the types of political reforms that will be needed to put policymakers in a position to actually solve problems are at the national level.

But as both Molly and Tracy have pointed out, a lot of the innovation is taking place at the state and local levels, so in terms of creative responses from the business community, ways to change the investment patterns in venture capital, it's like almost all of that is state and local.

MS. VAN GRACK: Yeah, so from my perspective to Darrell's last point, I think there's a lot that can be done at the state and local level. I mean, I've named a couple of them, but there are several states that have angel tax credits. You're seeing states that are putting out lists to your point about what LinkedIn is doing, partnering with foundations and organizations to create lists of companies that need investment, that are venture-backable, so that investors have the information that they need. Again, there is lots happening at the local economic development level to create these incubators and

accelerators that are really kind of ground floor for seeding an innovation economy.

So I think there's quite a lot that can happen, but I do think you will run into roadblocks. So the example of Arizona and their fintech sandbox, well, that's really creative and really interesting, but there are federal regulations around interstate commerce and you will likely need some sort of federal legislation to really allow those types of really broad, big innovation efforts to flourish.

MS. KINDER: Yeah, I would just echo, acknowledging CFR has a terrific task force report out that has some excellent federal policy recommendation. I don't think there's any doubt that if we're going to be serious as a country in tackling this, these are huge challenges, we need bold action from the federal level.

I think probably part of the reason why we're talking about local is because the political winds are sort of a little bit more in favor right now for that. But when I look internationally at sort of which countries are actually taking this seriously and who's out in front with pioneering new solutions, it's federal level policy. It's Korea, it's China, it's Scandinavia. No one has the full picture, but there's pieces. And you can see what it looks like when there's serious political will from a national perspective.

So I don't think we should lose sight of that. I think it's because of sort of the vacuum, we're looking at sort of interesting experiments across the country, but there's no question if we want to take this seriously we should be bold.

MR. WEST: So we are out of time. Those of you who would like to pick up books, we have them outside the hallway, outside the auditorium. But I want to thank Molly and Tracy for sharing your perspectives. And we look forward to seeing how things go. Thank you very much.

MS. KINDER: Thank you.

MS. VAN GRACK: Thank you. (Applause)

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