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P R O C E E D I N G S

MR. WEST: Good morning. So I'm Darrell West, vice president of Governance Studies and director of the Center for Technology Innovation at the Brookings Institution. And I'd like to welcome you to this event on AI and smart cities.

AI is advancing rapidly. It's powering autonomous vehicles and it's being applied in areas from healthcare and finance to retail. But I think one of the most interesting areas is smart cites because we know urban residents face many problems in terms of parking, traffic, air pollution, and crime. So cities are starting to deploy new technologies designed to help on each of those kinds of issues. There's a growing use of AI sensors, data analytics, and advanced networks.

And just to give you a few examples, there now are sensors in urban areas that let you know where the open parking spaces are. That's very popular. Mobile apps that help drivers realize where the traffic congestion is and where you can avoid those problems. And then green building systems designed to improve sustainability in terms of use of lighting, heating, and energy utilization. But some people have argued that the smart cities concept has been oversold, that we're not as far along as we need to be, and that in this area there are many challenges in terms of deployment, digital disparities, security, and public oversight.

So to help us think about these issues we have three distinguished experts. My colleague Nicol Turner Lee is a fellow in Governance Studies here at Brookings and she writes about digital disparities and new developments in technology innovation.

Adie Tomer is a fellow in the Metropolitan Policy Program here at Brookings. And he writes on metropolitan infrastructure and technological development and geographic differences in each of those things.

Lorie Wigle is vice president of software and services at Intel. And there she focuses on platform security and efforts to improve services. And we do want to thank Intel for providing financial support for this forum, so we appreciate its generosity in supporting this discussion.

So I want to start with Nicol. So you write about AI and 5G networks in the United States. So what opportunities to you see being created for cities?

MS. TURNER LEE: Yeah, thank you, Darrell, for having me. Thank you all for braving what was supposed to be bad weather. If we had a smarter city we probably would have had school closings and other things. But I want to thank you all for coming to Brookings to actually engage in this conversation.

So this has been a conversation in smart cities that has gone on for a very long time. Since I've been in telecom and tech policy we've seen this conversation on how do we actually make cities or localities much smarter given the explosion of new technologies. Whether it's the Internet of Things, with sensors, what we're seeing with cameras, what we're actually seeing with artificial intelligence which will be the topic of this conversation, as well, you know, cities want to be smart. And I used to say when I was on panels I'd rather be in a smart city than a dumb city going forward. (Laughter) And I think we're going to see much more evolution of that.

Why do cities want to be smarter? Particularly because it contributes to, I think, the sustainability of a city, in what ways could cities become more efficient and how they allocate resources, the workability of a city. You know, how can cities enable things like remote medicine, remote commuting, et cetera, as well as livability?

People drive less, so they want cities where they can actually move around. And my colleague, Adie, will be able to talk more about that in terms of infrastructure. But they want an abled infrastructure to have a better quality of life.

And I would add to that as a telecom person security. People want smart cities that also enable public safety and security.

All of those things I think are very important as we go forward. Technologies, applications, whether it is in medicine or telemedicine, telehealth, education, public services, public safety, transportation, all tie into the evolution of a smart city framework and ecology.

And Darrell, I would say to that, citizens benefit. And I study people who are historically underserved and disadvantaged. They benefit when they live in smarter cities. You're able to develop remote care facilities. You're able to bring laptops instead of backpacks to school. And you're able just to do really interesting things in addition to serving populations that are very disparately located, whether it's in rural or urban, or getting services right to individuals.

I remember years ago as a beginning Ph.D. student working and living in the city of Chicago. And I remember having a son at the same time that a person who was working in the same office I was while I was at school in a part-time job, she had a son who also had asthma. And in my case, I obviously at that time had, you know, pretty adequate and sufficient health insurance; she didn't. So she had to, every time the child had an asthmatic attack, take three buses to the emergency room to care for him. And this was maybe about 10, 15 years ago.

And when I look at this evolution of smarter cities I think about the engagement of sensor technology and other new technologies where that would have cut off for this low-income single woman the amount of time going to the bus, the amount of impact on the healthcare system to care for her child, and it would have improved her quality of life and her ability to work. Oftentimes, when she had to take her son on the three buses, she also had to take off of work.

So I think as we look at this framework of smart cities, we're beginning to see an evolution where we're matching technology with economic development and human care. And that's one of the things I think is getting elected officials and other legislators very excited about that investment in addition to technology companies, who want to apply technology for the public and common good.

So I'll stop there, Darrell, because I know we want to get more into other stuff, but I'll stop there.

MR. WEST: Okay. So Nicol has highlighted some of the opportunities. Lorie, I know you focus on platform security. So what are the security challenges for smart cities and how can we address them?

MS. WIGLE: So, first of all, thank you very much for inviting me to be here. It's an honor.

I think about the intersection of AI, smart cities, and security as having three different dimensions. So the first one is as we implement smart cities, we really need to be mindful of doing that in a secure way. And if you think about it, if you're implementing something like congestion management, you're introducing a lot of new threat vectors that might not have been there before, so opportunities for an adversary to have a negative impact.

So if you think about that congestion system, you may be dependent on something as simple as a traffic light sensor, but you're also relying on a lot of different devices that might be part of that network, including the cars that may be furnishing data bout the congestion. And so it's really important that security be built into each of those different elements.

The other thing that AI introduces is potential vulnerabilities in the models themselves. And so if the models can be reverse-engineered, they can be

tricked. And then models also are a great source of intellectual property, so they need to be protected.

If you think about us, we acquired a company called MobiLive. It does autonomous driving. Paid a lot of money for that company. A lot of what that company is, is really around intellectual property and the models that are used for autonomous driving.

So the whole notion of end-to-end security for smart cities is extremely critical and there's no substitute for the security being implemented at the design time. It needs to be designed in.

The second element that is really interesting, and Nicol alluded to this a little bit earlier, is this notion of using AI and city data for stronger security. And we have lots of examples that are starting to emerge there, things as straightforward as smart street lighting that have the ability to notice if there's unusual congestion or to do gunshot detection and that sort of thing, and feed that data in so that it can be analyzed.

We also at a really basic level can use AI techniques and machine learning to detect anomalous behavior even at the individual computer level, so heuristics that notice when an application is behaving in a way that it shouldn't. So there's another example of a really positive use of AI. And then, of course, those stronger systems can be implemented in the end-to-end infrastructure.

The other dimension that I think is really interesting is AI and to the extent it's used in smart cities really thrives on data. We need lots of data to do the training for the models to create robust models, for the artificial intelligence. And security technologies can actually be used to unleash or liberate that data in ways that protect the privacy, if that's an important consideration for whatever the dataset is, and also, as I mentioned, protect the algorithms around it. So the security technology ends up being an

enabler of the artificial intelligence and the applications for it.

MR. WEST: Okay, thank you. So Adie, I know you focus on infrastructure. So what is the current state of digital infrastructure in major cities and suburbs? And what should those places be doing in order to enhance their digital infrastructure?

MR. TOMER: Yeah, it's a great question. I'll say first of all, Lorie, we all wish we had congestion management, so I hope we get to that place. (Laughter)

MS. WIGLE: Right, exactly. Exactly.

MR. TOMER: So that would be a good start.

So, again, my name's Adie Tomer. I work in our Metro Program, so it's actually really nice to share the stage with my Governance Studies colleagues here at Brookings.

So right away I think the nomenclature we use here is a little bit of a misnomer in the sense that Americans don't live in cities. I mean, think about that for a second. Do you really live in a city? This is not a fair question because we're like in the city of D.C. and probably a lot of you do live in the city. But for most Americans we don't: 69.4 million acres are urbanized in the United States. That's actually a very, very small share of the country and I recommend you go look up a really cool Bloomberg News story about like how the land in America is cut up. Most of it is forestry, agriculture, et cetera, but we've got 69.4 million urbanized acres. Of that, only about a third of the population lives in urban countries. And then within those counties, only a relatively small share are actually in cities.

So America is not a country of cities. America is a country of suburbs. Right? That's what the vast majority of us live in. It's why we have modal use share, in other words how we get around for transportation, in particular for commuting: 75

percent of us drive alone to work. And, oh, by the way, the next highest one is 10

percent carpool. Right? So 85 percent of us are in cars everyday, right, because that's

the built environment that we've decided to produce over now about three to four

generations of people or seven, eight decades or so.

So right away there's this context, right, and some really, really good

advertising in this space that, honestly, my wife always loved. She loves when I do work

on smart cities because she thinks they're so cool. Except the advertising you realize is

all people in tall buildings, you see people crossing streets. Right? That's not what

America looks like.

So when we think about our physical infrastructure that's going to allow

us to unlock both of these opportunities that Nicol so eloquently talked about and that

Lorie started to talk about, the security context here, we need to think about a mix of

digital telecommunications infrastructure, which is really the backbone of this whole thing.

I mean, that's what takes us from analog cities. There're no really dumb cities, right, but

analog cities to smart cities, which is really digitally connected cities.

But it's also our transportation and water infrastructure that allow that all

to flourish. And, of course, our energy networks, which naturally a lot of us try to stay

away from because the regulatory frameworks there are really, really complicated.

But on the transportation front, what we need to recognize is that we're

really developing a country of have and have-nots. We have a system were the federal

government has kind of slowed their investments in our system, yet where they put their

money, those road networks are doing extremely well. So you're seeing pavement

quality on USAID highway program roads or it looks really good. On local streets,

pothole strewn, right? So this is the idea of you get off the highway, everything was

smooth and then, all of a sudden, you're on local streets, you notice the bumps. Right?

That's why, because we're not spending nearly as much money.

On top of the fact we don't have built-in maintenance programs. So as we continue to move outward, again, right, a suburban nation, we're not necessarily setting ourselves up for good maintenance on those roads.

But as bad as the roads might be in some conditions, they're not falling down -- that narrative is a little too hyperbolic -- but where we do see challenges on roadways, they are fundamentally more existential for our water infrastructure. So let me put it like this, especially for this conversation we're having today.

We in this country do not know, suburb or city, where our pipes are. So think about that for a second. Underneath the ground -- they kind of vaguely know, like there's a water pipe under that road, like of course. They don't even know exactly where it is on the road. Now, if you're in a city like Boston, right, or D.C. or Portland, like older markets, more than likely there are still wooden pipes moving water to your city and home. So we definitely don't know where those are, right? (Laughter) Because no one's alive anymore who put those in the ground.

So the challenges here are thinking both from a transportation and a water infrastructure standpoint, how do we manage our assets? Right? And this is actually called in both those sectors "asset management." Right? So how do we do better asset management? In smart city tech, digitally telecommunicated, what I like to think about as like water pipe Rumbas, you know what I mean, that are traveling around, like mapping these systems. You know, that's the stuff that unlocks these benefits.

But then, of course, to go -- and I promise I'll stop here on the digital telecom, what really matters -- and Nicol studies this, too, right, and there's quite a few of us at the institution that do it and many others outside of it. Right? The digital divide is persistent.

MS. TURNER LEE: Right, right.

MR. TOMER: So by our measures I'm saying something that we tend to look at more is subscription rates. We have over 70 million people live in neighborhoods where in terms of wirelines -- so I'm not talking wireless; I'll get to that in a second, but wireline -- 70 million live in neighborhoods where subscription rates are under 40 percent. Now, that's a lot to unpack, but let's just put it like this. When you walk through those neighborhoods, when you pass two houses, one of them doesn't have broadband.

So all this stuff we're talking about, all these benefits that unlock, especially if they're using it at home, if they want to telecommute, they want to access Telemedicine from the home, they may not be able to. And over 18 million of those residents in those neighborhoods are school-aged children. So when you read stories in *The New York Times* that they're taking their smartphone outside into a McDonald's to download homework, that's why. Right?

Now, the challenge is many of those families don't have smartphones. Right? About a third of American households do not have a smartphone. Now, that number is rising rapidly, so I don't want to belabor what those statistics look like. But in the end of the day, if we're talking about parking apps, right, it only works if you've got a smartphone. And not only a smartphone, but you have a subscription that ideally doesn't have pay-as-you-go style data caps on it, so where maybe you get to, you know, two weeks through the money, you're now all of a sudden out of data. Right?

So there's a lot of work to be done here. Folks in the private and public sector are working aggressively on it. But if we want to really tap into the digital potential of our cities and suburbs or our smart regions, then we need to make sure everyone's digitally connected and we understand exactly where our roads are, where our pipes are, and what the quality of them is.

MR. WEST: Okay, that's a great transition to Nicol, who has written extensively on digital disparity, so exactly what you have been talking about.

So the question I have for you is, as cities become smart and adopt new technologies, how do we make sure everybody shares in the benefits?

MS. TURNER LEE: Yeah, I mean, I think Adie's point is clear. And, you know, shameless plug, I'm doing actually a book on the digital divide. Follow me on the Digital Divide Tour and you'll actually see all the places that we're going. I mean, he's telling the truth. I was in Hartford, Connecticut, and there are young students that still go to McDonald's to do their homework, and this is in 2019.

But I think that there is promise, though, when you match up the ability of networks, or next generation networks, to not digitally redline communities so that they can have access. I see, like Adie, a lot of disparities that exist by income, people who are -- disproportionately people who are people of color, older Americans, people who are foreign-born, et cetera, rural Americans in particular. I just went down to Garrett County, Maryland, where they're basically living without broadband access.

But when you look at this potential of this new technology, and I'll play off of what Adie talked about and not call them smart cities, but digitally astute and enabled cities, you actually see a lot of potential. And you see a lot of potential in this paper I just wrote for Brookings about 5G enabling opportunities for people of color. You see the potential to move towards enterprise space applications, applications that matter, that improve public good.

Whether it's the ability of that young woman that I talked about to not take five buses, but to go to a remote care clinic to be able to get the service for her child for asthma, for respiratory; whether it's the ability of young kids to have the engagement and experience within the school, we have to have responsibility between public and

private sector partnerships to advance the technology.

But the challenge is cities have already done this. Right? Alleghany County, Pennsylvania, they've deployed AI systems to actually help with Help Line services, where they're helping to move quicker through the ten thousands of calls that they actually get; on child placement.

I would say the disparity in the area of smart cities and AI, in all honesty, is access. But I think one of the huge disparities are the consequences of what happens around this technology, whether it's privacy infractions as we talked about with Lorie; whether it's bias because the applications in and of itself are not inclusive of these communities.

So in the case of Alleghany County, give them a lot of credit, they ran this child abuse, neglect, non-physical abuse, obviously, hotline through AI. They found out that African-American kids were being disproportionately placed in foster care compared to white kids because the technology was not vetting bias. So I think that is actually the new divide that we're going to see when it comes to AI's applications in many of these locations.

Surveillance, facial recognition is being widely used in public safety for cities. More cameras means more people will be misidentified, which means that they will have a consequential result if they get picked up in a community which is highly surveilled.

So I think, again, going back to Lorie's point, I think these issues are the ones that are going to generate the divide in this space. We still have an access issue that we have to deal with. But fortunately, the new technologies, particularly wireless, is going to give us some hope because more people carry these than they actually have tablets. And it's not to say that they can do much on their smartphones in terms of doing

their homework, but they actually are carrying the computing power in their purse and more Cloud-related services are enabling them to reach more applications.

The key thing, and I'll just end here, with any smart city it's up to public officials to look at this whole landscape to ensure that it's an inclusive technology deployed, an equitable technology deployed. And if there's minimal access, that there are kiosks placed in institutional points, like libraries and churches and schools, where people can start engaging in this.

The unfortunate thing is the train has left the station. How many of you in here have actually gone into the DMV to renew your license? Exactly. The inline economy is slowly dwindling and we're going to be sort of at a race to get everybody there because of the efficiencies that it actually affords cities. And so that's something to think about, I think, when you -- Adie, it's your point, like when you start thinking about like this deconstruction of cities and how you actually accelerate access to all people.

MR. WEST: Okay. Lorie, I'd like to ask you about the public role in smart cities. So Toronto is an example of a city that has a strategy to become a connected city, lots of use of Internet of Things, devices, sensors, data analytics, and AI. But yet, there also are citizens there concerned about the possible loss of privacy, the loss of their personal data.

So what role should the public be playing as cities try and embrace these new technologies?

MS. WIGLE: So the first point is, I mentioned this a little bit earlier, you know, for these systems to function properly, we need a lot of data that goes into the models. And it's really important that the right mechanisms be put in place by the cities, the public officials that are defining these systems so that the data is protected and privacy's protected. And we have technologies that can help enable that either by

maintaining data locally and only sharing the insights from it that impact the model or by using mechanisms where data is only accessed in an unencrypted form in a protected space. But, again, those things need to be designed into the systems.

I had an opportunity a couple of years ago on a panel in Vancouver to interact with the CIOs of cities that ranged from New York to Singapore and a couple of others in Canada. And it was absolutely fascinating to understand more about how they were architecting these systems end-to-end, so that they were taking full advantage of the data, engaging citizens, but doing it in a way that preserved privacy. So it is possible, but it takes design.

MR. WEST: Okay. Adie, before the event we were talking about this data issue and you raised the question of who should manage the data links, like these pools of information that are being created by these digital technologies? And you made the interesting point, like who's going to be Federal Reserve equivalent in this situation? So it kind of gets into the governance question, institutions. Do we need new regulators, new institutions? Do we need new policies in this area?

MR. TOMER: Yeah, totally. It's like the graphic novel, who watches the Watchmen? Right? I mean, that's really what we're questioning right now.

As many of you probably saw, especially if you're in this room today, *The New York Times* ran a pretty aggressive story -- they weren't wrong, I want to be clear -- aggressive story about tracking, right, about phone tracking. And then their colleagues in that space, right, at *Vice* magazine, on *Motherboard*, ran a story on actually going to these data bounty hunters, who could really find, for $300 a pop -- which sounds really cheap to me, for like a private investigator -- can monitor exactly where you go. And, oh, by the way, like why they have the data is because you gave it to them willfully.

As my colleague and I wrote, just tried to write a treatise on this a little

bit, just trying to say like you did it because you wanted to call your mom, right, or, as

Darrell pointed out, to give him credit in the background, or you just wanted to check the

weather anywhere you go anytime. Right? So clearly, you want to be connected

everywhere, but we're asking -- and we're dealing with a really complex, philosophical

debate. It's not going to be my job to answer this. That's more a Governance Studies

(inaudible).

MS. TURNER LEE: Right. (Laughter)

MR. TOMER: But honestly, like what -- we all want to be connected all

the time. We want to have this -- basically we want the network to find us when we want

it, but we kind of don't want anyone else to know where we are at the same time. But

inherently, someone's got to track that, right? So there's an inherent conflict there. I

don't think that's complicated to put on the table.

What we're suggesting is that we need to be really thoughtful about this

regulatory conversation. My number one concern, which I feel safe saying, is that we see

a way too hyper-reactive Washington to this. And, in fact, you saw senators who -- I

don't think it's okay I'm saying -- all this is obviously on the record, like by the way, about

six months ago, didn't even know how to ask Mark Zuckerberg anything. Right? And

now they're saying, hey, we need to really aggressively regulate this. Right? Well, do

they understand all the contours of the issue of what's happening here, what's enabled

and what we need to secure when we have this conversation?

And there is clearly much more to be done on where we house this data,

who gets access to it, what are the models that get to run off of it, who gets access to it

where. You know, we have one of the world's best demographers to plug just Brookings

in general, Bill Frey here at the Institution.

And, you know, if you want to get data out of the Census, you need to

know a Census coding language. You actually have to go inside their walls and you have

to have a very specific certification for that. Is that what we're talking about here?

There's going to be some kind of quite literal data warehouse, right, in Washington that

stores all this data and certain people will be certified? Maybe, I don't know. But we've

got to have that conversation because otherwise you're going to see what's erupting.

In Toronto right now, where you have an actor who's won a contract with

the city, by the way, to try to think about what's the future of an IOT-enabled place built

from the ground up with a community that's really well educated and being, honestly, very

thoughtful. And there's a lot of real contentiousness, especially playing out in the media,

but a lot of amicability behind the scenes, too, between those groups just trying to deal

with this. Until we deal with it, we're not going to unlock some of these benefits because

it's inherently about we're all going to know where everyone is all the time. Right? And

that inherently has some tension.

MR. WEST: Okay, I have a question for each of you on the panel and

then we're going to open the floor to questions from the audience.

At the 3:00 today, President Trump is going to announce a new

Executive Order on artificial intelligence. So if you were advising him on the smart cities

part of this what would you want him to say? (Laughter)

MS. TURNER LEE: Will he follow script or will he not? (Laughter)

MR. WEST: You know, he's doing executive time now, so he actually

might be watching.

MS. TURNER LEE: So I think I'll give three points that I think are really

important for him to watch, and I'll pick up on what my colleague just said here.

I mean, there is need for some type of federal privacy legislation, and so

I would hope the White House would back there, where we could have a comprehensive

bill that looks at how that is collected, how it is shared, how it's repurposed, and the awareness of consumers and education for consumers to know that. Because that is obviously the fuel pipe of all of the stuff that we're talking about today. It used to just be email and now it's a lot more robust Internet that we're actually dealing with.

I think it's also important that the President when he puts this into place, particularly for cities, that they deploy what I believe are ethical frameworks around the use of AI. And that cities and particularly any federal entity that is actually deploying AI among citizens at large, that they think about those questions.

The challenges that I discussed with regards to facial recognition technology and bias, they're real. And they can have detrimental effects on cities if misused or if, as we're talking about, legislators are excited about the possibility of procuring this type of technology, but they don't know the outputs. Cities do not want to get the bad reputation of contributing to discriminatory practices or redlining communities or putting certain people in fear of danger simply because they just don't know how this works. So I would think the government really has a standard before they get into technological relevance and policy to be ethical in its deployment of AI systems.

I would also think technology's really important, that the government think about what type of enabling technologies need to be in place, what are the regulatory structures that need to be open to accelerate the adoption and the use of artificial intelligence systems within, again, public domain circles.

And I would think third that any type of legislation engages some type of citizen feedback loop. We all have the opportunity in this analog world, or at least we used to be able to have the opportunity, to tell our postal service worker if our mail didn't come. If there was something wrong with the system, or if the line was too long at the DMV, we had a way to communicate that. I think, again, and I would have a different

conversation in terms of their responsibility to corporate governance, but I think when we're looking at federal government initiation of these processes, that they give citizens the opportunity to give feedback back to these entities so that we can improve upon those systems and give the voiceless a voice as we move into these, you know, very decentralized systems that will essentially automate everything. You know, it's up to that.

And I just want to put one other thing, too, and I think Darrell has talked about this a lot, that we don't talk about when it comes to the federal government and deployment of AI systems. There will be consequences on employment. There will be consequences on income and possibly income inequality. There'll be consequences based on where you live, you know, what you earn, what you look -- there's going to be consequences.

And I think it's important, we've got a couple of senators on the Hill, I think McCarthy and Olson, who are looking at working groups, bipartisan working groups, to look at some of the ramifications of AI systems on these populations. I know the House Energy and Commerce Committee under Frank Pallone has put together a similar type of committee bringing corporate sector and public sector entities together and civil society.

So I think, you know, the government has some responsibility to engage in a multi-stakeholder process to ensure that we're looking at all of these holes before we go full-out in these systems and then cannot repair some of the damage that may be done in cities in terms of loss of jobs, you know, loss of educational competency, or whatever the case may be. Can't find enough workers because these systems require much more automation skills, all those other ramifications I think are really important in the AI bill.

MR. WEST: Okay. Lorie, your advice on the Executive Order?

MS. WIGLE: So I think that this should all be around the federal government as a role model --

MS. TURNER LEE: Yes.

MS. WIGLE: -- and enabling innovation and doing that in a number of different ways. So one is the government has access or has a lot of data, furnishing that in a very secure and sane way to enable the models and training and so on for these automated systems.

Trying things out, deploying some of these automated systems in a way that implements security by design -- again, a role model -- and not overregulating things proscriptively so that innovation can really thrive.

I think another really important area to role model is transparency of the data model -- or not the data, but the actual algorithms themselves.

MS. TURNER LEE: Yes, yes.

MS. WIGLE: And there is some new invention or an evolution of our invention that needs to happen there because these models are always evolving. That's the whole point of artificial intelligence is the systems are developing on their own. We need mechanisms to be able to reveal how the models have evolved and to do that, again, in a way that doesn't compromise intellectual property, but gives transparency so that we know that there aren't biases in the models, et cetera. So there's just a huge amount of opportunity for the government to really show the way here and to foster this environment to evolve in a productive way for us.

MR. WEST: Adie, your advice.

MR. TOMER: At first I was really excited that I was the last one to answer and then you all (inaudible). (Laughter) So I will give you all credit for -- I have two I want to add and I think they reflect on points each of you made.

So to build on this workforce side, it cannot be understated the importance of preparing our workforce. But even before that, right, which I think was, to be clear, in your comment, too, preparing, frankly, younger people which are more digitally fluent because they're more likely to be digitally native, right, but making sure that they are prepared to understand how to use technology to their advantage. Because that's a big thing of what we're learning from AI, right?

MS. TURNER LEE: That's right. That's right.

MR. TOMER: Is that you've got these algorithms that are going to punch out data in ways you maybe didn't even expect, in other words extract findings from it you couldn't see. But you still need to understand both how to potentially feed a model and also how to create the right analytics from it. Right?

So it's kind of like knowing how to speak a language doesn't mean you can write a good sentence. Right? But it means you have the tools to do it.

So how do we make sure that our workforce has those tools? I'll give you an example to something that Darrell kind of started his opening remarks around in the transportation sector. We are so excited about the digital tech here. Companies like MobiLive, right, are going to be able to do a lot here. But the amount of workforce we have in the digital -- in the transportation sector that's going to be impacted by this is 9.5 million workers by our calculations.

MS. TURNER LEE: That's right.

MR. TOMER: That's huge. If it was for anyone who has to work in economic data that would be like it's own two-digit NAICS Code. So that's a big deal in wonk-speak, right?

But there is no aggressive curriculum development here from K through 12. So in your mind imagine did any of you have like a digital shop class, you know? No,

probably. Right? But then it also continues on to community colleges, universities, and then, of course, with their colleagues and workforce development boards and whatnot.

So we need to be really thoughtful here on how we get people ready for this transformation.

MS. TURNER LEE: That's right.

MR. TOMER: So I think what relates to Lorie's point is I just really want to see government be more nimble in this environment. And that means that we all need to change our expectations. So this is not a partisan comment what I'm about to make. We have got to retire this remark from President Reagan in the '80s of government is the problem. That is already the wrong -- a step in the wrong direction. Because you cannot allow, as we were also talking about before we came out, you cannot allow autonomous vehicles to flourish if they cannot be regulated on the roads.

Government is a partner in all of this. It has to be. And what does that mean? They need to get more nimble, which means we need to let them innovate, which means, let's be really clear here, we need to let them fail. I mean, everyone knows there's like some Silicon Valley person who wrote a book where it's like I innovated by failing. Right? By the way, I'm Type A and hate failure, but we had to fail. Right? (Laughter)

But we know that, right? All of us know that in our personal lives, right? Innovation means trying new things, failing, failing, failing until hopefully you hit on something big that really works. Right? We need to let government do that, which means we absolutely have to change our perspective on it.

I think the most pernicious comment we can have from an AI perspective, just from a political angle on it, is when anyone from any party says something about like I don't trust government, right, or government can't help me here.

The whole system will not work without them. And I think you're seeing that pervasive in all three of our and Darrell's comments.

MS. TURNER LEE: And can I add on to that? No, I think you're completely right. I think one way that I've looked at it is government has to come in and allow innovation to partner with them, too, like innovative companies' partner. There is this idea -- because we just don't simply have enough R&D money that comes through government agencies the way that a company like Intel may have, to look at how we develop innovation in a way that is smart, efficient, safe, et cetera. So I think there's really a good role for partnership.

I think cities that have done this well, Sacramento would be one of those, they partnered with Silicon Valley to say, hey, instead of coming in and giving us something that we're procuring -- which is another thing that this AI conversation should be about, procurement -- you know, let's figure out ways that it could be open sourced or let's figure out ways that we can work together to develop really neat innovations that help the digitally divided, that advance healthcare, et cetera.

One of the things I think that all of us didn't say, and if we did have our other colleagues, this is a Brookings love fest from Foreign Policy up there, these are really intricate systems. I mean, I don't want to date myself, but when we started talking about smart grids, we started talking about the weaponization and takeover of smart grid technology. And we weren't even talking about AI, Darrell, right? We were just talking about, you know, sensors being able to talk to one another and electric companies and utility companies being able to enable network infrastructure or smart infrastructure for electricity.

If any hacker gets involved with any AI systems that's vulnerable, particularly at the government level, we're in trouble. We saw that with our democratic

systems. We definitely don't want to see it with AI and new smart city innovations.

So I think things like security is something that this government should lead with. And areas that they do not know, they should look at the private sector and other colleges and universities that are working this space and partner as opposed to saying, hey, we can do it or, what we saw in the Zuckerberg hearing, we think we got this, when they really didn't.

MR. WEST: Okay. We'd like to involve you in this conversation, so questions or comments. Yes.

We have a microphone coming up to this gentleman in the front row. And if you can give us your name and your organization.

MR. SCHROEDER: Hi, I'm Paul Schroeder. I'm with a company called Aira. We do video -- connecting blind people using video camera technology so that they can get information about what's around. And it actually leads to this smart city question.

The thing that excites me the most for people with disabilities is to have real-time data about things like construction barriers and other issues, bus situations, transportation, real-time, street-level data. But what I haven't heard anybody talk about is how do we get there? How do we get that data available to people?

And for a company like ours that relies on a really robust cell network to be able to send video up from my point wherever I might be to a sighted assistant who can then look through that video and tell me what's around, whether there are issues in the area, what building I'm near, all the kinds of stuff that would make a huge difference not only for people who are blind, but for people with physical disabilities, people with intellectual disabilities. There's a ton of value in data and in connectivity, but I don't hear anyone in the smart city movement talking about how this is going to really impact and make communities way more successful for people with disabilities.

MR. WEST: Okay, great question. Reactions?

MR. TOMER: Yeah, I can take it first. You all might have some comments and this is just my own take on it.

We have not had nearly a robust enough conversation at the urban/suburban level, this is probably not for the feds or even the states, about what are the outcomes we want to achieve? And I think the way you just presented that, all of a sudden creates additional motivation for why we want to deploy sensors in certain ways.

Some of what the digital tech is so promising about is you can see this whole new world open up, but the problem is there's more interventions we need to make than we have the capital to do it with. So we have to make really thoughtful investments in certain ways, so it's going to be prudent.

Everything you described can be done. Right? So the question is how do you motivate folks who are in control of the public purse, as well as their collaborators in the private sector, to deploy their capital in certain ways? There's only so much capital to go around. So we're going to need to have that robust conversation. Otherwise, you're going to have -- which I think Nicol kind of alluded to, what was happening and is still happening is too often -- and this is not -- I'm not trying to bury the private sector here at all. It's that -- but if they approach a city leading with the technology that's not how cities and regions think.

MS. TURNER LEE: That's right. That's right.

MR. TOMER: They think through outcomes. I want to make people's lives better. So when you can say here's how we can make people's lives better, then it makes it much easier to build a partnership with the private sector who can help deploy that technology no matter what the financing relationship is between the two.

MS. TURNER LEE: That's right. Yeah, I was going to say, Paul, we've

known each other for quite some time, right? I know the smart city, I mean, just dating back from the disability role in technology, I mean, we started with having larger screens and video outputs and more audio capabilities on devices. And now we've actually seen its deployed in this ecology.

I would suggest, you know, just like my colleague said, and something that I also think applies to how we look at the disability community, technology has always been about solving problems, particularly the public sector. Right? What problem are we solving? And are we deploying the right strategies and solutions to solve that problem?

And again, as I said earlier, I think with any type of public sector investment or government-led role, addressing the issues and needs of the disability community is also prime to addressing the needs of these other verticals of healthcare, education, social services, et cetera. That's important for cities to lead by.

The city is not in this business, or should not be in this business, to do something that's commercially viable where their citizens pay the cost of it later. They should be in the business of making sure that the people are connected.

So I totally agree with you. You know I'm all for more sensors so that we can enable cities that actually allow all people to participate.

I think, Paul, you also alluded to, just real quickly, we also need the networks that can actually carry those capabilities. That's why conversations around 5G are critically important if we're talking about next generation wireless services, not because 4G LTE cannot do those things, but we need much more -- you know, lower latency, much more high bandwidth connectivity so that we can do more enterprise-based applications and Cloud-based applications. It's really important.

It's not about how fast you can download your movie, folks. It's about

what Paul said, you know, whether or not he's going to put his foot out into moving traffic because a sensor was on delay or is right on point when it came to its ability to capture that data and put out an output.

So I think, again, we have to have simultaneous conversations, whether it's 5G, 10G, 1G, 2G, whatever the case may be, how do we get to the next level of broadband infrastructure so that we can support all of these capabilities going forward?

MR. WEST: Other questions? Okay, there's a gentleman over here. There's a microphone that's coming over to you. And if you can give us your name and organization.

MR. BYRD: Yes, good morning, panelists. My name's John Byrd with the National Society of Professional Surveyors, NSPS.

One of the best, most transparent platforms out there for geospatial data is the GeoPlatform. And the United States Geological Survey has a model public-private partnership for enhanced LiDAR data that is the underpinning for a lot of the actual topo or literal contours of the cities, if you will. And I just wanted to kind of get your ideas for how else can smart cities blend geospatial data, geographic data, into the AI theme so that you could actually have available data for folks to maximize use of smart city opportunities?

MS. TURNER LEE: Lorie?

MS. WIGLE: No.

MR. TOMER: Well, yeah, so we just talked about sensor, I don't think she had a chance. So I've talked to the USGS folks a little bit and then in particular their colleagues on the FHWA side, which is all, blah, D.C.-speak, so Federal Highway Administration, U.S. Geological Society -- or Service. Right? Anyway, I can't even do it. This is why we have acronyms.

The gist of it is this. I kind of alluded to this earlier, but let me dive in just for a split second more. When you don't -- it's one thing to not know where the water pipes are. I mean, you know what they're dealing with, so I'm kind of saying it for everyone else, right, this is what we need to do. If you don't know, to Paul's question, like when I say "exactly" where the curb cut is, I mean exactly where the curb cut is. You cannot manage it in the ways that we're alluding to here.

We are allowing ourselves to have flights of fancy of how like regions will operate perfectly. That's a good thing, right? Creativity is inspiring. But in the end of the day, if every -- like let me put it like this. If you use Apple Maps on your phone versus Google Maps, they do not have the same road network. There's not a common like universal road network. So could we ever create a common platform for all kinds of various innovations, no matter where they're coming from, public or private, if it's not on top of the same data platform?

Because I don't know about you, but like if you walked up here, clearly there's a piece of metal right there, right? Like that operates in space. It's not moving. So we need to decide what's our common -- like what sits into this common pool of knowledge that's fixed as much as we know like the laws of the universe, right, and then figure out who manages that platform. And there is -- I mean, you this, so I hope this is part of the reason you're asking, there is so much more surveying work that needs to be done before we can actually even begin to unlock all these opportunities.

So that's why, when I said earlier, why I get so angry about the thought of like government's the problem. Oh, no, no, no. We're not solving any of this without government. Any of it. It's impossible. So thank you for the question.

MR. WEST: This gentleman here in the front row.

MR. MACRAE: Hi, Chris Macrae, Norman Macrae Foundation.

So I'm interested in the concept of maybe AI is about retraining everyone at the same time that you retrain the machines. So I'm wondering, could there be an urban planning game or something? So, you know, if 20 years ago we had chess masters being tried out by the AI, if we go the right sort of game and then this would get government and the AI involved at the same time and hopefully the public, as well. So is something like that the way forward or how would you see the way forward? Given that you were introducing these examples of how maybe New York is fairly easy to put AI into, but maybe Detroit with, you know, 200 blocks of suburbs it's almost impossible to put the bandwidth into?

So how does one leap forward and get government involved? And could we have a game approach or how would one do it?

MS. TURNER LEE: Yeah, I mean, I would say, Chris, to your point, it's tough. Because I think there are a lot of disparities, I don't want to call the inequalities, but different levels of adoption that exist within cities where people actually understand what that looks like. The early urban development planning, I happen to be a daughter of an architect and a sociologist, so we look at cities differently in terms of social constructs. You know, you walk people to the table. Again, the technology was there for -- you know, why are we using technology to solve this particular problem?

But there were a lot of naysayers, too. I mean, older Americans didn't trust the technology. They didn't know why there was this conversation. Younger people at that time, when I was young, we used -- I tell my kids, you know, I can't beat them in interactive games, but I could sure beat them in a game of PAC-MAN.

This whole idea of gaming to actually create I think this uniform adoption of AI is going to be very similar to what we actually deal with, with the digital revolution right now where we have not yet come up with a concept where we've adopted --

everyone has adopted new technology in a way where it advances economic development and social development.

I don't know if that's answering your question, but I think -- you know, I look at a place like Detroit. Years ago, Detroit did not even welcome technology into the public schools. Now we're seeing new technology coming to schools as part of an in integrated process versus, you know -- and, again, I dealt with the superintendent many years ago where I was like, hey, we're going into broadband access, it improves outcomes. And they sort of said, we're not there yet because we're still trying to build schools. And so that's not what we're trying to do.

So I'm not sure if that answers your question.

MR. MACRAE: I just mean more at the expert level. So doctors sort of accepted that AI is now better at diagnosing, but it took a long time to get into that. So I'm talking about the sort of games so that the experts can evolve, as well --

MS. TURNER LEE: Yeah.

MR. MACRAE: -- so everyone upgrades their learning and their questions of this sort of (inaudible; off mic) system at the same time.

MS. TURNER LEE: Yeah, but doctors have a different liability I think that they -- in terms of adoption, which I think goes back to Adie's point about regulatory frameworks and legislative frameworks. You know, I think in a case like AI, what I deal with, with algorithmic bias, if people knew how bias operated under a very opaque Internet, they would obviously be smarter. But you cannot get to that core point because not everybody fully understands how the Internet works.

So we're still at this place, I think to your point, you can bring experts, at the end of the day, when you talk about smart cities, it's all about citizens, in my opinion, that have to be at the table and part of the process.

MR. WEST: So if I could pose a question to the panel. Which cities have made the greatest progress on smart city applications? Like are there good role models out there, either in the U.S. or non-U.S.?

MS. WIGLE: I can start. So I think the strongest example that we've seen and interacted with is Singapore, where they have done a really, really good job of an end-to-end implementation, very much architected and holistic as opposed to, we were talking about this earlier, sort of pockets of automation, but rather a system overall.

MS. TURNER LEE: I mean, I would say domestically I'm a big fan of -- we've had her on panels -- of Sacramento and what they've done to look at very granular processes that can be automated and how they've sort of used that and mashed it with education. I think we had the CIO that was actually on the panel, one of the panels that we did.

And I'm a huge fan because back in the day it was more like parking apps was considered AI 1.0, right? And now, you know, they're doing really neat things to make sure that they're coordinating their sensors in ways that are productive while, at the same time, constantly evaluating what that system looks like. And so I would say for myself who studies smart cities, cities that have that evaluation sort of built into how they're deploying to me make high bar, particularly in the United States.

MR. TOMER: Yeah, I mean, there's -- I think the short answer for the U.S., as Lorie kind of said, so I'm just repeating it, is that it really depends on what you're talking about. But we don't have a whole-scale system solution, partially because, back to answer the first question, right, to Paul's, is what do you want to achieve? And there's more than you ever want to achieve in such early days of digital tech to show like some wholesale experiment except in a much more, frankly, top-down governance model. Like we can see it in Asia where you're able to actually deploy the networks more

aggressively in certain frameworks.

So it's an unfair fight, I think, for the U.S. in many ways when we start that comparison. And while you're right that when we say what's the best examples tends to be you see U.S. folks saying it's not here.

From a management perspective, just to add to it, you've got Bob Bennett in Kansas City, I mean, their amazing work there. You've got this network of CTOs from other cities, including actually South Bend, although their CTO just left. That's part of the reason their mayor is able to run for President now is they have the best like Rumbas in their water pipes basically, from my joke earlier.

So it really depends piecemeal on what you're looking for. And for folks who are interested in this question, because we get it a lot and I'm sure by Darrell asking it, it is really symbolic of probably what many others are thinking, is look for examples based on not smart city insert best ad or something. Think about what you're looking for, right? So is it, hey, best congestion management, like with digital tech? Like that's the way to Google it, if you will. And then I think you'll start finding more resources.

MR. WEST: Okay, I think we have time for one more question. Right here on the aisle up front. And if you can give us your name and organization.

MS. WONG: Okay. Katie Wong with (inaudible) TV. We know that U.S.-China is in intense competition in this AI field. So I would like to know in your opinion what's our advantage in this competition and what's our vulnerability? How can we compete more effectively with a country like China as the government has so much resources and they don't care too much about privacy and so on?

MS. TURNER LEE: No, I think you're right. This happens to be one of the conversations that comes up in telecom and technology policy all the time, the U.S. race with China to be the top at 5G, to be the top of AI. And China has boldly told us in

so many ways that they are going to top us out.

I think part of it is, and I think it goes back to maybe Darrell's first question where I'm optimistic about the deployment of smart cities, is our regulatory structure here in the United States is very outdated. And you literally have to go locality to locality to deploy the systems, where in China you can make a national decision to free up, you know, high-band spectrum to run 5G networks, you can move government out of the way to allow the private sector to flourish. Very light -- I would say in China, I was telling somebody I don't think it's like light touch regulation. It's like we're going to do this, we're going to make sure it happens, where here in the United States we still have, you know, certain regulatory permissions that have to be sought. We still have a certain ethical responsibility in terms of how we deploy these systems. We still constantly evaluate within various working groups use cases. And we still deal with issues related to privacy that are of major concern to citizens that will be affected by these systems.

So I think there will be -- I think one way to reframe the narrative is not who is the race to AI, but who is the race to responsible AI in ways that will achieve the outcomes and outputs that we've all discussed, but at the same time keep citizens safe and not create additional vulnerabilities? Going forward I think that will be the conversation in the United States that may, from an international governance standpoint, sort of trump the other conversations around who is first because we do need these systems to be very resilient. And national security should actually drive any institution of AI systems going forward. I truly believe that.

And so to your question, you know, China may actually beat us on certain things and beaten at us at fin tech. I was just looking at WeChat numbers and the financial inclusion market. There are certain things their citizens have been able to engage and benefit from that we can't do here, you know, because of incumbency and

other regulations. But I'm hopeful that the United States and other countries, maybe even the EU, based on what (inaudible) does, will deploy responsible systems with few ramifications and inputs -- outputs that are dangerous -- you know, have dangerous outputs to citizens.

And so I think that should be the conversation we should all engage in, particularly in something like AI that can be weaponized and has the consequence of bias.

MR. TOMER: Oh, you're staying away. First of all, I think the truly federalist deployment of technology in the U.S. is a feature, not a bug.

MS. TURNER LEE: Yeah.

MR. TOMER: And I think it's really easy to think, especially with what's coming out of FCC right now, that what's better is, hey, let's get a common construction platform, frankly, and that's going to be better for cities. And I couldn't disagree more, which is a different conversation.

MS. TURNER LEE: Right, I was going to say.

MR. TOMER: With that said -- yeah, I'm not trying to start a debate.

MS. TURNER LEE: A whole other panel.

MR. TOMER: With that said, right, how do you see that play out that instance here? Right? So famously, Eisenhower comes back from the war, sees the autobahns in Germany, right, they're done before ours, and says I want to build something like that. Now, that's the national narrative and that really did happen, but the federal highways were actually under debate for more than a decade prior to that.

So what took so long? Well, that's America. Right? It takes forever to figure out what we want to do. That's a feature, not a bug. Right?

So what often ends up happening is we need to deliver consensus to

end up with a large-scale investment program. Right? So I'm hopeful in this one that that leads to the same outcomes. Right?

So to extend the metaphor a little bit, there are not -- look, you're exactly right. Let's say like on the fin tech, it's out in front and that looks by all accounts like that is going to be a net gain for China. We also don't have ghost cities in the middle of nowhere where no one lives because there was like outright just construction. This will work, right? And it just didn't. And that's because our democratic systems would have beat it back before it could have gotten too far.

So I think what we're going to need to lean on, and you're seeing similar debates in Europe, right, if anything more intense in some ways, is how does the democratic system manage something as complex as AI without some of the benefits, but also challenges that come with more top-down governance? And yeah, what are we really in a race for here? Right? The Germans had highways before us; we have the highway system you can basically see from space, right? Which one's better? I don't really know. It depends, but we still got to where we needed to go in the end.

And so I think Nicol and I are in agreement on that. It's what are you actually racing for? I think what you're really racing for is the outcomes you want to achieve. And those are probably very different actually between China and the U.S., and that means you're competing against yourself.

MS. TURNER LEE: And if I can on that one, I think Adie's completely right. I think we're actually going to see more of a race towards different use cases and different verticals. Like how is AI being deployed in healthcare? Who's getting to that technology first? How is it being deployed in connected cars or transportation? Who's getting to that technology first?

The challenge, and I think it applies to 5G very much in terms of why we

talk about the race by China and 5G, is the experimentation, the standards, the patents,

all of that is going to matter as these systems actually evolve. And I think that's where

we have in our head the hype around the race because whoever gets there first will

actually manage or control the devices and all that that run off of that, the chips,

everything.

        And so I think it is a serious conversation that we need to have and I

think we do need some kind of national platform to move us along. But we'll pick that

conversation up later because, again, the patchwork that we have in the United States

just makes it more difficult to actually roll out uniformly some of these new technology

systems.

        MR. WEST: Okay, we are out of time, but I want to thank Nicol, Lorie,

and Adie. Thank you very much for sharing your views and thank you very much for

coming out. (Applause)

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