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From Here to There: The Evolution of Mobility

Speakers:

Jay Baron, Center for Automotive Research

Vivek Kundra, salesforce.com

Michael Littlejohn, IBM Smarter Cities Strategy & Business Development

K. Venkatesh Prasad, Ford Motor Company

Susan Zielinski, SMART, University of Michigan

Moderator:

Russell Hensley, McKinsey & Company

Hensley: Okay. So good afternoon. And welcome to the session from Here to There: The Evolution of Mobility. It's kind of relevant because we are where we are. We are in Detroit and we're in some, as most folks say, interesting times.

Just very quickly I'd like to introduce the panel that we have today and then give you a sense of how we're going to run the session. We've got about an hour, just less than an hour. And we'll have a little bit of an introduction from each of the panelists to give their perspective on the future, future of mobility and how they see that panning out. Just a couple of minutes on that.

And then we'll actually talk through some of the things that may accelerate that, some of the things that may get in the way of actually reaching that vision. And then we'll talk about some of the winners and losers that may be in that future vision.

And then we'll come back and open it up to the audience. So between now and then, please be thinking of some of the questions that you'd like to ask, again, a diverse set of panelists that we have.

So to my left we have Jay Baron, the CEO and president of the Center for Automotive Research; followed by Vivek Kundra, who is responsible for emerging markets within salesforce.com. We then have Michael Littlejohn, who is VP and partner from IBM, IBM Smarter Cities. Then we have Venkatesh Prasad, Prasad, from Ford Motor Company. I think responsible for Open Innovation, a senior leader within Open Innovation within Ford, Ford Advanced Research. And then we have Susan, Susan Zielinski, from the University of Michigan, who is responsible for SMART, or Sustainable Mobility and Accessibility Research Transformation, and easy for me to say. So great.

With that, let me just set a little bit of context, if I may. How do we look at -- the session is titled "From Here to There." And what does "here" look like? I'm going to let the panelists take the softball, which is what "there" looks like, really, and define that.

But what does here look like? And I would characterize it in, again, quite succinctly in three or four words, actually. It's quite congested, right. We've got a billion cars or vehicles on the road today, right. Come the next 30, 40 years, that will at least double. So we'll go to something like 2 to 4 billion vehicles on the road, come 2050. So again, it's congested being number one.

Number two, it's complex. I don't know if you have bought a car recently. But if you buy a car in the U.S., you can choose from about 280 different models, fuel types. You've got a couple of fuel types typically on the market today. One of them is gasoline, one of them is diesel. In the future, it's going to be multiple. Again, it's complex from a vehicle standpoint.

It's also complex from an infrastructure side of things. I don't know how many cities look exactly the same in the world, but I'll bet there's not very many. Again, it's highly complex from not only the types of things that we have on the road, but the roads that they run on and the cities within which they run.

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And thirdly, it's costly. To give you a sense, right, it's costly from an emissions standpoint. Right. At the moment, we tend to cough out significant amounts of carbon and carbon dioxide, which is obviously concerning us and concerning the regulators.

And then, two, from an economic standpoint, on the transportation of human beings and goods in 2010, we spent about 8 and a quarter trillion on the planet. Again, the third descriptor would be costly.

So it would be congested, it would be complex, and it would be costly.

And the fourth attribute would be it would be convenient, I would say. If we look at transportation, it's relatively convenient. All right. Getting from an office downtown Detroit to here literally took me about three minutes. Again, it was very, very convenient. So that's my perspective of where we are today.

Again, relatively succinct, not necessarily comprehensive. But let's move to the future.

What do you think of the future, Jay and what the future of mobility will look like?

Baron: First of all, I think what's interesting is we do have this convergence of the electronics into the automobile which is an interesting dynamic of itself. These two different fields sort of operate on different wavelengths with a different phase. So they are not really in sync together. Software, electronics is outdated much faster than the cars wear out. So that's a challenge for the auto companies.

Interesting, I had to update the software on my radio and basically reboot it. And, first of all, you have to leave the car running, takes 45 minutes. You have to sit there. And the manual says when the computer -- when the radio says it's done, it's not really done. You still have to do some more things. It's a very cumbersome convergence right now. And I think the auto companies will work through these details and try to get these things back into phase.

One of the technologies clearly that's here today that is an enabler going forward to the mobility that we're talking about, of course, is autonomous vehicles. And the technologies by and large are available today. They are not maybe available for mass market, but they are available and we have prototypes and we can make cars drive themselves. I think it'll be a real milestone the day that we can actually have the consumer sit in the car and literally take their hands off the wheel and let the car go down the road on a public Highway. That's a little ways away.

I think going forward, even though the technologies are here and there are issues around how we deploy those, what really has to be wrestled with is, what are the policy implications and what is the business case? Because these two have to go hand in hand in terms of motivating these technologies.

Clearly the two biggest motivators for this type of technology have to do with traffic mitigation, fuel economy, and safety. And with traffic mitigation, we are trying to reduce our dependency on more highways, very expensive cost to maintain highways. We don't want to build more highways. We have traffic congestion. In some cases we can't get more traffic onto the highways. \$1.25 million simply to resurface one mile of highway. And how many highways do we have to resurface? It's very expensive.

Then on the safety side, we have the National Highway Safety Transportation Administration saying our goal is zero fatalities due to crash. Well, zero is really a big hurdle, and today we have -- so it's 40,000, 50,000 deaths a year due to crash. But if you have a car that can drive itself, that means the car also knows not to crash. And if the car knows not to crash, maybe zero is not such a far-fetched objective.

The other thing in the field that I actually work closely in is the structure of the car and the crash-worthiness and the materials going in the car.

We are expending hundreds of dollars per vehicle to make these cars lighter and safer, to get better fuel economy. Well, if you do make these cars so they can drive themselves, you don't need 10 air bags. You don't need crash structures under the car.

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You don't need a lot of things. So there's money there that perhaps can be transferred over to the electronics or sensors so that these cars can eventually drive themselves.

So there's a lot of motivation for this autonomous vehicle technology. It's clearly going to have to be motivated initially from the government. If we simply wait for the market to take care of itself, it's going to take a lot larger than waiting for the market to pull this technology out. So I think there's a significant role for the policymakers that have to help motivate some of the development of these technologies.

One final comment I think is on the legal side. We talked about looking at a car or technology that takes control of your car. That's a very scary thing. And in the litigious society that we have here, it's often been bantered about, you can have a technology that saves nine lives but once in a while it makes a mistake. But 99 percent of the time, it's effective. That 1 percent of the time is enough to put a company out of business.

So we have to weigh the value to society as opposed to looking at our legal system and who's trying to innovate in these technologies. Autonomous vehicles are coming. It will be interesting to see how some of these issues play out.

Hensley: Great, thank you. Vivek?

Kundra: I think when you look at the industry itself, I think the whole industry, the whole ecosystem is going through a massive transformation. So first, I think you see this transformation, whether it's happening in cities or around the country in terms of the intelligent transportation infrastructure. We're seeing bleeding of the digital and the physical worlds from investments that are being made, whether it's in smart grid, investments that are being made in terms of sensors. We're already seeing data being mined on a realtime basis. And cities around the world that are democratizing all these are in traffic patterns enabling cars to be more intelligently routing, allowing people to make intelligent decisions, and creating a level of transparency that had never existed before.

You're going to continue to see innovation at that level. One will be around this platform. And government obviously has a huge role in that in terms of enabling it. Whether through how it spends money on the infrastructure. When you think of the pace of innovation when it comes to roads versus tires, roads and the materials that are used to build roads in the last 30 years, you really haven't seen a lot of innovation. But you have seen massive innovation when it comes to car tires.

So that's one area I think in the coming years you're going to see a fundamental shift not only in the material science, but also in terms of how those investments are made, how do you actually invest up-front so you can get realtime data, analytics, and fundamentally rethink how a city is engineered.

Hensley: Okay.

Kundra: Second area I think is going to be around the cars themselves. So you're looking at this entire Social Revolution with about 1 billion people on Facebook, over 200 million people on Twitter. The question is, you know, why can't your car be social? So Toyota had come to salesforce.com, to Marc Benioff, and talked about the future of technology when it comes to cars themselves. And they are putting out a car called Toyota Friend which literally addresses the issue of, why isn't it that your car can't tell your dealer that it needs its oil changed? Or why can't your car, as its driving, aware of its context, tell you there's a special Groupon deal available on this block? Why can't your car tell you, you know, your friends are all meeting in a certain place? And why don't we all get together and meet in that same place? I think you're going to see the social technologies fundamentally change the way cars are actually engineered themselves, beyond the autonomous vehicles.

And then I think the third area is going to be a business model disruption. For too long, what you have seen is that the relationship between a buyer and the car is managed by a dealer. I think that in the coming years, that's going to be disrupted. Car companies are going to be able to have much better insight in terms of what their customers want on a realtime basis because they can actually manage that relationship with their customers and drive these innovations. Right now, all that is

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being driven through a third party. And from a policy perspective, obviously, a whole host of issues are going to be raised, whether it's around safety, as you mentioned, or whether it's around the legal framework you're seeing, states like Arizona and California, passing laws enabling autonomous vehicles. I think you're going to see that across the country and the world.

Hensley: Good. Thank you, Vivek. Michael?

Littlejohn: Russell, the way IBM has looked at it, we focused on the concept of urban mobility because we think that's where the issues tend to be the greatest. And Vivek used the term "ecosystem," which I use as well. And the way we view urban mobility and the way we think that effectiveness is shown in urban mobility is by managing a complex ecosystem that's made up of vehicles, it's made up of travelers, it's made up of passages, roads. It's made up of public transportation option, even bikes. And it's made up of parking and parking availability because that's a key part of the ecosystem.

And so the way that ecosystem is managed is that data has to be captured. Data has to be integrated. And then intelligence needs to be applied in order to affect the greatest transportation and the greatest movement through these urban areas.

So let me give you an example of something that happened to me recently of how it is today and how it will be tomorrow. I live in a suburb about 15 miles, 18 miles north of Midtown Manhattan. A few weeks ago, my wife and I were going to -- we had tickets to a play on a Friday, a summer evening on a Friday. And we were going in early for dinner.

Now, we are faced with three options to get there. We could drive door to door. We could take public transportation door to door. Okay. Or we could take a hybrid approach. Drive part of the way, park, and then take public transportation to our destination. The challenge, the good news and bad news -- the good news is there were probably dozens of pieces of information out there, everything from Google Maps to transit sites. The down side is I ended up -- it was unwieldy and I ended up just having to rely on my instinct, being a 30-year, 40-year resident of New York City or the suburbs.

And I don't know if -- we were on time. I don't know if I guessed wrong. In fact, we took the hybrid approach. If you know New York, we drove down to 86th Street, we parked, and then we hopped on I think it was the 2 train down to Times Square and had dinner and the play.

In the future, though, what people want is that they want to be able to do that automatically. They want to -- they want the system to understand where are you starting from, where are you going from, and then have that application go out and pull out everything that's relevant. And oh, by the way, allow you to set your preferences, because if my preference is to get there as quickly as possible, the options may be different than if my preference is to get there as green as possible or as cheaply as possible.

So this concept of urban mobility is all about managing this complex ecosystem, pulling the data and then adding intelligence to it.

Hensley: Wonderful. Thank you. Prasad?

Prasad: Let me sort of start off with a couple of macroeconomic and perhaps historical perspectives. As human beings, we have been around on the planet for 150 million years and it's been the evolution of mobility from that day on and we were moving forward, but just not as human beings. And today we are at a point where we have 5 billion-plus people moving. Almost everyone moves, whether they use the need for ambulation and help or not, but they are moving.

When it comes to specifically personal mobility and motorized personal mobility, we have, in terms of licensed cars, trucks, and buses, about 1 billion, as you pointed out, Russell. And that number is just increasing. And what's really fascinating is with the linear increase, you could argue perhaps faster than the linear increase in the number of vehicles, there's an exponential increase in the number of interactions that vehicles are having with just about everything, whether it's entities within the vehicle, the Bluetooth phone in your car, or whether it's speaking to a traffic light near you.

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So that's, I think, where the real value proposition is. As you look out into the future, I really see this coming together of motorized and non-motorized mechanisms of mobility. And I don't think we should trivialize the non-motor pedestrian walking, bicyclers; that still is going to be a significant part of who we are and how mobility is going to be managed out in the future.

So I think it's really the dynamics of the value propositions for the multitude of services that would be potentially offered at the right value positioning, whether it's through a coupon positioning service or whether it's parking. That's really going to determine the decisions and the participation you find across the globe.

It really behooves us to take a view that's not centered necessarily in Detroit, but looking at what Detroit offers as an immense power of knowledge and wealth in terms of its manufacturing history, its manufacturing depth that we still have here, and take that and translate that to sort of connecting these gears to just about everything that we will be needing going out into the future.

Hensley: Okay. Wonderful. Thank you. Susan?

Zielinski: This is just so wonderful. I feel like what I was about to say was sort of a composite of all these different things. You said some things I had never heard of before, so I'm really excited about this panel and how we can connect the dots.

So I guess what I'm going to do then is a bit of a summary of some of the things that you have been saying. So I had in mind more options, more connected options. And something that might be different from now is that they are focused on the user from door to door. So rather than focus on the infrastructure, the mode. So the dots are connected. And the modes and the services and the technologies and the infrastructures are all connected.

So it would be sort of like you know how Thomas Friedman says the world is flat, I think it's like transportation is flat. As you said, Prasad, there's more of an equality amongst modes. Some of this might be wishful, but I'm going to say it and put it out to the universe: Cleaner, greener, safer, healthier, lighter, more equitable, more lucrative, more nimble, more tech-supported, and in terms of the integrated way finding and the fare payment and the traffic management. And first and foremost, hipper and sexier. It's no longer the big, heavy machine thing. It's this really cool, forward-thinking, interchangeable ecosystem.

And I think I heard about it's going to be about moving goods as well as moving people. But I think it's also going to be about moving less, so we don't actually have to move if we don't want to. So we can design cities so we can take shorter trips. We can have local production and distribution, urban farming, which is really happening here. And also tele everything, telework, teleshop, telecommerce, telemedicine, tele-education. It's also -- one thing I think I heard, I think it's the foundation of one of the biggest emerging industries akin to Silicon Valley. And the industry cluster is beyond manufacturing and embraces the information technologies and also the real estate, the tourism, the finance and economics and also the small IT and fractional uses you can use any time you want.

There's going to be an exciting industry opportunity globally and then some regional cluster development opportunities from an economic point of view.

And finally, I think it's going to be regionally customized, which is nice. I see it being less of a cookie-cutter kind of a thing and much more that what we do is we map out and we listen to what the needs are of our own communities, and we have these different options as menu items that we can combine in the best way to meet our community's and our region's needs from both the human liveability point of view and the economic point of view.

That's all I have to say.

Hensley: Wonderful, thank you. There you have it. That's the future of mobility, I guess, in five short bites. Interestingly, one question that comes to mind, if we think about the drivers of those futures, right, and future visions, I think there is a future

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vision, and you have all painted different versions as we move towards that. Trying to understand, what are some of the drivers, right.

Traditionally, if we think about an industry, if we think about something growing, we think of macroeconomics. We think about regulation, we think about technology, and we also think about demand traditionally in the auto industry, which is, as was highlighted from Prasad, we're 120, 130 years old, in essence, right, in the motorized version of the auto industry that we know. The biggest driver of innovation to date, we could argue the point, but typically in the auto industry is regulation, whether it's fuel economy, whether it's safety.

If we look back over the last 30 years, that content has been driven primarily by regulation.

The futures that you defined, what do you see as some of the primary drivers? Again, is it macro, is it technology, is it regulation? Or is it consumer pull?

Susan, go ahead.

Zielinski: I feel the above are drivers. That's why I like it. Not just fear them. I think one of my favorite drivers is global urbanization because it changes the paradigm. It says: Oh, okay, now, wait a minute now. We used to be able to actually think that as long as every car has alternative fuels and, you know, has light materials and all the right things, we'll be okay. But I think the urbanization shift has happened.

Remember back in 2007, that big exhibit about we have just crossed 50 percent of the world is living in cities and soon it'll be 80? Then you start to think about Beijing's nine-day traffic jams and you start to think of everyone in Beijing or India that's still walking and bicycling or in a car, even if it was like the cleanest car on the planet, it's really not conceivable. And their cars would become offices and houses and take up just too much space.

So I think actually for city leaders, for people who have to manage the complexity of not just transportation, but the whole caboodle, urbanization has been a really great driver.

Hensley: Okay.

Baron: Obviously, I think we have talked about this before. The whole generation of wires. There is going to be -- I agree with what you said, Susan, because it's going to be all of the above looking at different things. And, you know, you have heard the stories, but I have seen it firsthand with my own kids where you take away the keys to the car, but heaven forbid, don't take away the cell phone.

The interests today are different than the interests when we grew up. We used to like to drive cars. Anybody here remember Fahrvergnugen, the fun of driving? It's becoming obsolete. There will be a demand from society and from kids from the new generation who are looking at transportation much differently than we used to as younger people.

And then obviously a number of other things that I mentioned earlier about traffic. I think there's a role for policy, for the government, public interest, in terms of safety and other things, if left to the free market, will move too slow. And so they will motivate certain things that are healthy for us. A lot of us wouldn't spend more money today to get a greener car. Some of us would, some of us would not. In fact, more of us would not. You need the government to sort of step in on some of those things important for all society longer term.

There will be a role for the market, a role for the government, a role for the auto companies. Auto companies still have to make money. They have to keep making money through all these transitions at the same time.

A lot of very dynamic forces, I think, will play out.

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Hensley: All right. Anybody else? Okay. Let's move. So --

Zielinski: Can I just throw one little --

I know I have been talking too much, but culture. I just think this social networking and fractional use and sort of systems approach in seeing portfolios, it touches on, you know, the connectivity, your kids and the digital stuff. But I think there's a kind of a social shift that came out of the Digital Revolution that can't be underestimated. I think it really changes the way we want to do stuff.

Prasad: If I could just add to what Susan just said, if I had to pick one, it's the consumer that drives. If no one buys a car, we're out of business. No matter how much we get regulated or not get regulated. We are not here.

So what we're seeing is an evolution of new ways by which consumers are going to influence and shape both product definition and also the experience of mobility and what it means to go take multiple choices of modes of transportation and get from A to B and come back home, as Henry Ford said, safely.

So our goal is, at the end of the day, to ensure that we bring everyone back home safely. But how we do this and how the chisel begins to work on shaping this future is going to be ultimately determined by the consumer. And the consumer is immensely powerful. Every time someone touches an application on a smartphone, they are trying to say something and the back end better listen to it. That's the chisel of today, right, in shaping the future.

Hensley: Wonderful. Maybe Vivek and Michael, we could push on one of the other drivers. Again, I bucketed them as macroeconomics, as regulation, technology, and consumer pull. If we think of technology and if we think of some of the waves of technology, whether it's in the vehicle, whether it's the connection of the vehicle, whether it's the city and how the technology evolves in the city, how is that as a driver? And what's the relevance?

Kundra: I think, as Susan mentioned, in terms of the social aspects, one thing that's happening, I notice a lot of people buying cars now, what they are doing is they are asking really basic questions, you know, given their experience with their iPad or their experience of going on OpenTable and making a reservation to their favorite restaurant or going to Expedia and booking an airline flight. They are asking, you know, why is it that when I walk into a car, like that experience is so alien. It's almost like you take them back a decade in time.

And I think the winners in terms of innovation are going to be car companies that close the technology gap between what's happening in the consumer Internet and what's actually happening in a car and the ability to do so, obviously, in a very safe way.

You know, artificial intelligence becomes really important. Voice recognition becomes really important. So technologies we're just beginning to see become mainstream now are going to be part of the way cars are hardwired, so that fluidity you feel as a consumer, you know, whether you are on your iPad or behind your PC or you're using a mobile device, that hasn't happened yet.

And I go back to something I said about the relationship between the car companies and consumers: It doesn't really exist. I can't tell you the number of cars that I've gone through throughout my life. I never really end up having loyalty to the car company or the brand. And the reason was because there was no relationship. It ended up being through a dealer.

I think in the same way you saw a company like Apple disrupt the music industry, I think you're going to see that happen to dealers, where you're going to see this massive disruption of the dealer ecosystem.

Littlejohn: You're already seeing the problem with the dealerships, who no longer have many cars to fix anymore, trying to find alternative revenue streams to repairs, which has always been the profitable side of the business. They sold cars at cost and try

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to make money in repairs. You can have a car for three, four, five years today without having a warranty claim on it. The quality has gotten so darn good. So the dealership role in this is clearly transforming as well, which is what you're saying.

Hensley: Let's come back to that because I absolutely want to get to the business model.

But, Michael, thoughts on technology?

Littlejohn: Yes, I echo what Vivek said. The challenge is that safety area there and what can you do? If a car is stationary, we can do a lot to make it emulate everything else we know. In fact, it's going to get worse now that the airlines are starting to ease the restrictions of what you can do on an airline. Hey, if I can do this on a plane, why can't I do it in a car.

We have done a lot of work around, for example, allowing and enabling hot lanes, where people come in and go out in dynamic pricing. The thing that challenges us is how do we communicate that to the driver and still stay within that safety zone.

So I think that last frontier is not just moving these technologies from the car, to the automobile, but moving them in alternate interfaces so that you maintain that high level of safety. I find myself now absentmindedly issuing commands in my car, as if I'm on an iPad, and I realize I'm in a different environment. But every other screen operates the same way, so why should that screen operate differently.

Hensley: Sure. If I move to Prasad to pick up on a couple of things and not to poke things too much. Your understanding of the consumer, right, you're on the advanced side of things. What are you doing to really understand the consumer and get to a point where you have kind of a common interface that people are used to?

Prasad: Yeah, I think we certainly are observing the world, and one thing in the last 10 years is the democratization of innovation. It's not just we who observe, but almost anyone has the tools now to observe, and not just observe, but to actually build some value, proposition around the observation and then participate in a collective creation of value.

So that's what we're embarking on and really trying to look at, if you will, the crowds, but also smaller groups of folks who can actually have these probes in smaller context, whether an urban context in a city or whether it's someone who is trying to fix the car on their own and upload software or download something that needs to be done to get them on the road again.

So it's really this new ecosystems that are coming out of existing dots, but that's the dealerships that are thinking through, you know, what they are going to be doing in the future or really new dots appearing in new ways in which these dots are getting connected.

I think it's just a whole wave by which we're coming to learn how consumers want and how we can provide value back to them.

There's a couple of examples. One, you know, might seem mundane, the poor old wiper blade that goes left and right, swish, swish. All of us have sung to 2-year-olds and little kids about how buses go, and school buses in particular. Now, if you have 10 wiper blades, 10 sets of wiper blades activated, that's some really useful piece of information for the person one or two miles behind on the same road. And that's sort of a collective, if you will, crowd sourcing of mechanical activity there. But that's a piece of intelligence that we can get, garner, harness, semantically label and present as a value proposition.

Likewise, in the context of health and wellness and if someone has a pollen allergy and you are able to issue the alert by matching up data that exists on the web at zero miles per hour, it's something that you can't look up when you're driving at 70 miles per hour. If you have the right presentation mechanism for you that issues an alert and gives you a choice of route based on your pre-stated allergens or your preferences to certain kinds of pollen content, you can take different ways back home and yet come back feeling fresher and come back feeling good and send you back home safe.

Hensley: Good, good.

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Prasad: I think it's a mechanism.

Hensley: Susan, you had a comment. Just hold the thoughts a sec and let me pose a second question or another question.

It costs us something to be mobile today. Does the cost of mobility to the consumer go up or go down in the future and why?

Littlejohn: I think cost goes up and convenience goes up. I think people will pay for convenience. That's the salvation of the car companies. That's the salvation of the dealers. So I think, you know, you're going to pay for this convenience, but people will buy that convenience.

Kundra: I was going to say another way to think about it is cost goes down depending on how you measure it. So I make poor decisions today because I have bad data or no data, right.

For example, when you're talking about, you know, getting on the train. I am much more likely if I know in a realtime basis my friend is driving down the highway by my house and we're going to the same place, to be able to say: Hey, can you just pick me up or why don't we carpool together or use this bimodal transportation routes? That's going to be a fundamental shift in terms of the cost equation.

Baron: Then if you come back to the connective vehicle, it's like, okay, \$21,000 car costs about \$40,000 over the first five years of its use for everything that you use. But you only use it 10 percent of the time. So if you can have a connected vehicle and you only need a car 10 percent of the time, it really enables the Zipcar concept of calling up the car, come to your door, take me from A to B, and I'm done with it and you release the car. You don't have to go downtown to look for a Zipcar or something like that. This technology could enable -- and that could reduce the cost to consumer.

Littlejohn: What if you treat cars very much like software? What about the ad revenue of a captive audience sitting in a car? You could change the fundamentally change the business model and the economics.

Baron: I don't want to watch ads every day in a car, but there will be a way to make that work, I'm sure.

Littlejohn: That raises an interesting point about the intersection of commercial entities and partnerships. You know, when I'm driving into the city, I would love to know who is having a parking special that day. I drove into Manhattan yesterday or the day before. And I can't keep track. This has a special from if you come in between 8:00 a.m. and 9:00 a.m. This is 7:30 to 8:00 a.m. and this one is before 11:00.

So having that interface and whether I'm driving past and Starbucks is having a sale or whatever, but bringing those other partners into the vehicle. You spend so much time in the vehicle and we're looking for bargains, we're looking for parking. We're looking for coffee. And we can get that now, but it's awkward. We have to pull out our phone. We have to fumble with it. That seamless interface which requires, you know, joint partnerships between the manufacturers, between the third-party data providers and between the private sector.

Hensley: Absolutely. Susan.

Zielinski: Yeah, I was just thinking about some of that stuff because I think we have the potential for costs to be more accurately reflecting what we're doing and accurately reflecting what we're costing in general. So what we're costing ourselves and society.

So on our own side, you know, when you buy a car and then you put gas in, then you kind of are thinking that the gas is free. Like once you have put the gas in, you're just driving anywhere. You don't really think about it. You don't kind of --

Whereas if you have your iPhone or mobile phone, and for everything that you do, you know, you are on the bus, you reserve the car share vehicle, and then you get off the bus at a new mobility hub, you get into the car share, you swiped the iPhone

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over, and then you get to the train station, you swipe it again. And each interaction is costed out. And that also has the potential to send messages to, you know, what is going to be more cost-effective or more environmentally friendly for society. So there are many more sort of accurate and granular opportunities.

And on sort of a slightly wider scale, I think what you were saying, Vivek, about how it affects the larger picture, if these kinds of systems allow us to live in places that have all of these amenities and more easily get around, then we don't actually have to own a car. So that reduces the cost a lot. But it's still good for the car industry because the car industry still has to supply the cars that are in the city. So I think it has some -- I don't see it so much grandly going up or down as much as being much more accurate.

Hensley: I think all extremely valid points. If you think about it, there's an infrastructure. If the infrastructure is going to be updated, that needs to be paid for. If there's less fuel being used, then there's some taxes that need to be recouped, right? Again, to plow back into the road. I think quite a complex equation.

And speaking of the business equation, right, there is a business equation that goes along with it, with the 8 and 1/4 trillion that I talked about in 2010 and moving people and goods. What does that business model look like in the future. And right, the killer question is, who wins? Because you've got to have a different environment, right. You've got this coming together.

I was just taking notes as we were talking, right. You've got the design of the vehicle being very different, right. You can imagine this small, easy-to-maneuver, needs to be easily parked, certainly in the urban setting, right, as we move more and more towards that, as Susan talked about. You've got this, again, onslaught of electrification, right, for cleaner vehicles. At least at the tailpipe, right. The source of the energy is obviously key, and that needs to be cleaner, too.

So it needs to be charged at a turning point in that setting.

You have the third piece, which is the connectivity. It needs to be connected to the city or to the other modes of transport. So in that world where you've got smaller vehicles, which traditionally haven't been big winners in terms of profitability in an auto industry, it's highly electrified. Again, different sources of energy. So macroeconomics changes. The demand for oil changes.

And then this connectivity with, again, many links. Again, Susan, you talk about many links. What does the business equation look like? Who wins in that future state?

Susan, you want to go?

Zielinski: Yeah. I was thinking about -- when I think who wins, I think, first of all, what are the general benefits? For me, the economic benefits are not just for the individual or just for the big auto company. In general, sustainable transportation, if optimized, should really save money. Right? So we've got kind of a conservation side. That's one economic benefit.

The other is it should create jobs. It should offer the opportunity for more service jobs. There are a lot of kind of connections in the more complex systems. And I think actually that's probably a better kind of a job than maybe short-term construction gig which is counted into all the job counts. But maybe not as fulfilling as being able to be sort of a transportation expert or in that service.

Also in the high-tech side, there's a lot of possibility for job creation in this field. Also the emerging industry, from the point of view of how are car companies like Ford and Toyota rethinking themselves. Bill Ford often talks about thinking of it as a transportation company rather than a car company. And how are the smaller entrepreneurs actually getting into transportation in a way that's beyond the darned old battery? And I love the battery thing, but there are so many more things than that for really smart entrepreneurs. There are the iPhone apps we've been talking about and then the small services that connect the dots between the different sort of public infrastructures.

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So I think -- I suppose what I'm trying to say is that everybody wins because if we're creating a system that serves an economically vital, very liveable city, people will want to live there. Or even a region, not just the city. People will want to live there. They are going to be able to get around because it's affordable. More people are going to be able to do it. It's not a matter of you can get around if you can afford a car, but you're stuck if you can't.

There's greater access for everybody. So I see like the costs, like the triggers of measuring the costs, I think the actual benefits are going to spread across if we actually deliver the systems that we need to.

Hensley: Okay. Let me just move along because, Prasad, if you had to pick a winner as opposed to everybody wins -- which is wonderful.

Zielinski: I can never pick winners, sorry.

Hensley: If somebody wins, again, as an incumbent, you have a tremendous know-how of how these things are used, right, vehicles are used. But there again, there is to Susan's point, there's a much bigger pie. Again, is it the incumbent that wins, is it newcomers that win, or at least take the lead here?

Prasad: Maybe at the risk of saying, there are going to be some big losers. We just don't know who they are. Have to be. Every 5 years we notice this, every 10 years we certainly see this. There are enough examples if we just dial back 5 years or 10 years.

I think what would happen is if you take the \$40,000 number that Jay mentioned and you look at the asset utilization and you say it's 10 percent and therefore, it's \$4,000 value you're getting for that \$40,000 cost of ownership, I'd say it's much less than that today if you factor in congestion. So it's not moving. So if you are moving at 1/10 of the posted speed, then it's a \$400 proposition value that you're getting, not a \$4,000 value proposition. So it's really who gets the rest of the \$39,600? There's an opportunity and that's up for grabs, really.

Whether it's services or the car makers or whether it's the folks yet to be identified right now. I think that is really a prime opportunity. \$39,600 waiting for a car. Multiply that by the number of billions of cars coming ahead of us, that's the opportunity.

Hensley: Huge opportunity. Michael?

Littlejohn: I agree with Prasad. I think it's -- I think the winners, we don't see them yet. I think it's going to be a whole cottage industry, you know, to take advantage of ride sharing, you know, car sharing. It's different than ride sharing. Asset sharing, you know, purchasing as a cooperative. And I think there's going to be an influx of providers at the intersection of data handling and social media, I think, that's going to take advantage of this.

Hensley: Okay. Cool. Vivek?

Kundra: So I think we clearly know who the losers are going to be, right? Because they are doing exactly what they have been doing since the 1900s.

In terms of the winners, I think what you're seeing is a set of companies that are approaching this with a beginner's mind. Right. That they're coming at this with a completely new way of thinking about mobility. So you look at the autonomous vehicles. It's interesting a company like Google is sort of investing extremely heavily in that.

But that's also being done against a backdrop of what I think is very interesting in terms of not having mobility at all. Right. If you look at a country like Australia, they are investing \$37 billion in running fiber to every single household, to 20 million people.

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So a country like Australia now has the ability to fundamentally reinvent what healthcare looks like and how you deliver healthcare through telemedicine. How education looks like. You no longer need to come to a classroom to get educated. You can deliver it through the fiber infrastructure.

So I think that, you know, if I had to pick a company or a set of companies, I would say, you know, it's the companies that are, one, coming at it with a beginner's mind. Two, we've already seen this movie play out in other industries, like Amazon versus Borders, right, where you've kind of seen a beginner come in and say: There's a different model, there's a new model. We need to fundamentally hit the reset switch and disrupt the status quo.

Hensley: And for somebody -- the Borders example is a good one. Winners and losers.

Baron: I would just mention that one scenario is cars are becoming somewhat commoditized. It's a backbone, it's a vehicle to move from A to B, but you're not buying a car because it's got a bigger engine than the other car. It's a mode of transportation. And if that's the case, then the value created by the auto company to make that pod that goes from A to B, the value added is going down over what cars have traditionally been.

So that's going to open up new value on the electronic side in terms of the information management, the apps, all these various services that support the system. And auto companies obviously would wisely start migrating into that field. They obviously have to deal with HMI, the human machine interface, and all those things. But that's going to become standardized, somewhat standardized across the industry. That's not a differentiator.

But when you start talking about the use of these vehicles and all the wonderful things that we just talked about in terms of cities and traffic management and all that stuff, the companies that learn to take advantage of that and move at the rate of electronic and digital advancements, is where the money is going to be made.

So in the outcome center, they're going to move into the field somewhat as well and try to protect some of that. I think it will be a dynamic undertaking.

Hensley: Good. I want to open it up to the audience now and see if we've got questions. I can't quite see where the mic is. Over to this side. But if we have a question, please. Yeah.

Pittman: Hi.

Hensley: Yeah. You're on.

Pittman: Adrian Pittman with Detroit Creative Corridor and Module. The question is really to the entire board. Of course the discussion with mobility and transportation often steers more towards the automotive. But obviously multi-modal as was brought up at the beginning, is an important part of that growth. A lot of the data that is being disseminated along the mobility route that has to do with couponing and other value-added propositions is privatized largely so it's very limited in its scope.

The question is, how do you feel about the community, for instance, the City of Detroit or the State of Michigan's, involvement in creating a centralized location for that data so that these platforms can be more useful to the audience?

Littlejohn: Yeah, I'm not sure that's a municipal responsibility. Someone has to do it. I think there are other ways that the City of Detroit, I think, can play a more central role.

For example, I'm working with a few cities who are focused on putting forward this vision and tying it into parking. They are -- and essentially what they want to do is they want to capture this information so there are all of these entities, information entities, that the city controls, whether it's on roads, on projects, on status of subway trains or buses or everything else. They want to provide that information in a sandbox and use it as a germinator for other for-profit entities to build, whether it's insurance companies doing mileage-based insurance, whether they are app developers adding value.

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So they want to aggregate and disseminate the information that they control. And then, through economic development, attract other third parties to play in their sandbox.

So that's probably -- as opposed to them going out and collecting information from the various parking companies, that they want to create this standardization, this model, this data model, and then create this sandbox to germinate opportunities.

Kundra: I think what the City of Detroit could do, one, is begin with itself, right. Democratizing all the data and asset that it owns, as you mentioned.

Second, put in a legislative framework mandate, wherever there's government money that's spent, that that data will be made public, that it'll be open, and you'll have open APIs, so that third parties could develop applications and create, you know, the level of application that most people need.

Think about it today. If you wanted to get on a bus, it's literally like going in your car and sitting for 15 minutes before the engine starts. You actually wouldn't want to go in the car, right.

And that's kind of how bus routes work today. Cities around the country haven't done that. They just haven't taken the simple step such as democratizing this data and allowing third parties, as you mentioned, to innovate and build some of the most innovative apps that most consumers are actually demanding today.

Hensley: One quick one, Susan, and then we'll move to the next question.

Zielinski: Okay. I couldn't agree more. And I think this really calls into question how does policy have to change to support the speed of innovation and also the community capacity. Because I've been hearing, just having found out in China lot of the maps are not actually as accurate as they could be because of that relationship of public information, and yet the new technologies can allow that.

If our policies can provide a framework rather than the really specific policies that lay out sort of all the rules and regulations, it takes so long to make those policies and to pass them. And by the time they have been laid out and passed, we're on another technology. So we have to really rethink how we provide frameworks with sets of guidelines and principles and open API, open source type of policies that really support interoperability.

Hensley: Okay. Wonderful.

Please, next question.

Betto: I'm Arnold Betto, Wayne State University. We've been talking overwhelmingly about automobiles. There were a couple of mentions of bicycles and I think trains were mentioned one. But maybe this is because we're in Detroit, but can we not imagine that other modes as well figure into the evolution of mobility? Or are they going to just be adjuncts to the car?

Prasad: I will start off by saying non-motorized mobility has been with us for 150,000 years. And it's going to be with us for the foreseeable future. We have to be compatible with that and really grow together with that. There's absolutely no way without doing that.

Littlejohn: The way we define urban mobility is anything that moves that gets you around. New York City just announced the bike share program, following Paris's lead and a few other smaller cities across the country. So it is truly, you know -- our definition of effective urban mobility is taking advantage of all of the different modalities of transportation that are available in a city.

Hensley: Okay. Good.

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Please.

Attendee: So I have two quick questions that are related. The first is if this Information Revolution comes about in new automobiles, how do you gather similar data from non-linked automobiles? Like how do you retrofit them to fit into whatever comes? Because regardless of which technology wins, you're going to have some cost, which is going to be 99 percent of the infrastructure for the foreseeable future.

So how, number one, do you gather data from cars? Is there an opportunity to input like third-party systems into existing infrastructure? And then also, on a systemic level, could you retrofit these old cars that are going to be the reality for at least the next 20 years, if not longer.

Hensley: Okay. Prasad.

Prasad: Yeah, it's a really good question. In the United States, it takes about 15 years for about 95 percent of our vehicles to be replaced. If you come back now in the year 2027, you will still find about 5 percent of vehicles that you see on the roads today, but 95 percent of them would have been replaced. It takes a long time to replace that investment. And the number applies more or less in the same way as maybe 20 years now of the market.

What we certainly have to do is to create the toolkits that enable the safe extension of existing vehicles, whether they are platforms bent into the vehicles, the platforms that are zero miles an hour out in our service station in the back, or back on the road.

And so really what we're going to see are the evolution of these enablers for innovation at the grassroots in the hands of the third-party developers. You are kind of seeing this in the world of phones today, iPhones and Android platforms, those are the buzz platforms today. But you will increasingly start seeing this in the form of hardware editions and software that comes on to all kinds of other forms of solutions associated with personal transportation.

Hensley: Okay. Thank you. Is it the phone that needs to change or the car that needs to change?

Prasad: I think it's both, right. The consumer is changing.

Zielinski: On the consumer, is it all right if I say something?

Hensley: Please.

Zielinski: We're doing this study on how consumers are changing. And part of it is that we make consumers be a certain type of consumer up until now. So a lot of the research on transportation is what's better, buses or cars or bicycles? And it becomes a food fight across modes. I have this story about how -- or I imagine this story how if God were to say: Do you want a heart or a lung or a pituitary gland? And you'd say: I want all of them and I want them to work together. But it's so difficult to understand how people understand a system of stuff, like a portfolio of things, versus one mode.

So how could you either get out of your car or move towards a whole system of things? So this work that we're doing is looking at the consumer from that point of view, that they are doing many different tradeoffs. And I think once we start doing work that looks at the consumer that way, it will continually allow the consumer to be more that way and continually allow us to produce more things that suit those needs. So it's multiple needs.

Hensley: Wonderful. Last question, please.

Attendee: Hi. So one of the really exciting things about this conference is talking about how technology is enabling all kinds of new solutions. And talking about, you know, big data, digital technology. And when you think about it in the context of mobility,

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it's bringing together vehicle OEMs, infrastructure, electronics companies. They are not necessarily stakeholders who have a strong history of working together.

So when you think about the sophisticated technologies or products and services that will need to be developed in order to bring these concepts into a marketplace, what needs to happen to bring all of these diverse stakeholders together? Are there new mechanisms for collaboration that need to evolve and be structured? Who are the right people to create those mechanisms?

Hensley: Let me just preface this because we have literally one minute left, so we can have 10 seconds each.

So my answer is yes, we do need new models. Jay?

Baron: Well, the auto company owns the car today and owns the real estate inside the car. And they are going to be looking for partnerships and relationships to bring people in to work on that together.

So I think at least at the onset, it's going to be the auto companies looking for partnerships and bringing in the players. And that may evolve or change over time. Initially, I see that being the model.

Hensley: Prasad -- or Vivek.

Kundra: I think the market forces are well underway to make that happen. And secondly, I would say that, you know, this notion of a beginner's mind and companies that are looking for the more innovative path is what is driving them because of the education consumer.

Hensley: Michael.

Littlejohn: You have examples in other industries of this collaboration. Look at intelligent buildings and the collaboration between companies like IBM and Cisco and Siemens and Johnson Controls. So the precedence is there.

Hensley: Prasad.

Prasad: We have been building cars 109 years and proud to be building great cars. We certainly recognize our future is not just building cars. We're looking for collaboration.

Zielinski: And what a beautiful question because much of what -- much of the work that Mark does at the University of Michigan is to until this coalesces, to act as a link tank in cities in India, South Africa, Brazil, and the Philippines to bring together private sector, both small entrepreneurs and big businesses, academic institutions, all levels of government and NGOs, to map out the grid and to together work on not only how to make the transportation system improve, but how to develop economic opportunities around it.

Hensley: Okay. Wonderful. Thank you for the question. Thank you very much to the panel.