

AI and You

Transcript

Guest: Todd Litman

Episode 62

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Hello, and welcome to episode 62! Today we will conclude the interview with Todd Litman, who is founder and executive director of the Victoria Transport Policy Institute, an independent research organization dedicated to developing innovative solutions to transport problems. His work helps expand the range of impacts and options considered in transportation decision-making, and his research is used worldwide in transport planning and policy analysis. Among many publications he authored the *Online TDM Encyclopedia*, a comprehensive Internet resource for identifying and evaluating mobility management strategies, and is a blogger on the Planetizen website.

Todd lives near me, and although we didn't meet in person out of Covid distancing rules, you'll hear him mention place names that are likely only familiar if you're in British Columbia. But it's not hard to figure out what he means. Victoria, Nanaimo, and Duncan are three large-ish cities joined by a road that goes over a low mountain pass that may have snow during the winter. The Western Communities are an area that's growing and putting a strain on the highway to Victoria. Let's get back to Todd Litman.

I am pretty skeptical when somebody claims that by 2030 you will have fully operational level 5, where you would trust this car to drive, let's say your 11 year old child, with nobody else in the vehicle or that it would be perfectly okay for your car to drive you. Say to, you know, some destination downtown, and then drive home unoccupied. That I think may take, you know, it's possible that there will be enough breakthroughs and keep in mind there are a couple other steps. So, let's say you did have fully capable level, say level five, by 2027. But, it usually takes a couple years of testing and regulatory approval before you're able to actually sell this thing without the way with... especially with the advertising that actually specifies that this will be allowed to take your 11 year old child, and is allowed to operate totally empty. Okay, so even if the technology, there's the technology but there's also the regulatory testing and approval that just to be safe, where you got to add a couple more years to your development cycle there.

And I want to talk about that because like I said earlier, I was stunned at how I could do this experimentation. Do you foresee by that point, since if they change nothing from where we are right now, then you would just be able to turn it on because the government doesn't have to say anything other than, I don't care where you are in the car, you're driving it, we will hold you responsible for what happens. But, by that point, if the level four becomes a serious proposition, how will regulatory agencies and municipalities adapt? Will they for instance demand that there be geofencing of the capability, so no autonomous capability can be turned on in certain areas? What do you think?

Well, certainly if that's what it takes for safety, there will be pressure for those kinds of controls. I don't predict that, but let me ask another scenario. So, many of the predicted benefits of

autonomous vehicles, things like reducing traffic congestion, and squeezing more vehicles per lane, and reducing energy consumption, or increasing energy efficiency, and reducing pollution emissions, pretty much depend on autonomous vehicles having a dedicated lane, so they can platoon, they can operate within a few centimeters of each other, at relatively high speeds. So, many of the benefits that the advocates, the autonomous vehicle advocate predict, depend on the department of transportation or ministry of transportation saying that this highway lane between let's say Victoria and the western communities. two of the six highway lanes are going to be dedicated to autonomous vehicle operation and so in order to take advantage of that facility, in order to use this public facility, you have to have one of these expensive new high-tech vehicles. Okay. At what point, if you were the mayor or the minister of transportation or the other policy maker, who's deciding how the regulations, by which vehicle users should be able to use roads, highways; at what point are you going to say yes, we're going to dedicate that just to autonomous vehicles and, what are you going to charge for that use? So, I would argue for fairness sake, that in order to for autonomous vehicles to use a dedicated autonomous vehicle lane and gain these benefits like faster travel and more efficient travel, that you should be paying the full cost recovery cost, you should be paying a price that represents what it costs to provide a traffic lane. And that actually works out to be a lot more than most people realize, most people have never bought a highway, they've never paid for a highway lane, and so they greatly underestimate what it actually costs to add capacity on a major urban highway and so the logical fees would be somewhere between let's said 50 cents and two dollars a kilometer between downtown Victoria and the western communities. You might justify some lower prices - that's the full cost of recovery, so you're assuming, you're adding a whole new lane, just for those vehicles, you can structure the analysis somewhat differently. But the interesting thing is, a lot of people say, "Oh traffic congestion is terrible, I want the government to solve our traffic congestion problem," and you say; "Sure that's fine. We'll just build another lane for you but we're going to charge you the cost of adding that lane," and suddenly when you do that people say, "Oh I didn't want that bad."

Right.

I want new traffic capacity. I want wider bridges and wider highways as long as somebody else are paying for that.

So, let's talk about some other venues though because out here 18 wheelers are a relatively rare sight. But, let's talk about say the I-5 corridor or Interstate 10. Now there the amount of truck traffic on there, if those were autonomous, I can see them having a dedicated lane; just dedicate one of the existing ones rather than even building a new one. So, let's look at, the case you were talking about earlier of drive to the on-ramp, and then something drives itself, say a thousand miles to an off ramp. Now that looks like there's a cost benefit ratio to the trucking company for platooning with one human driver asleep in the back, while this thing takes place, and there seems to be a lot of experimentation already in in that direction. Do you have any evaluations as to where that might be going?

Well, it's an empirical question. Here's the way I would frame it. We would ask, if roads were efficiently priced, so users had to pay the incremental cost for the facilities that they use, how would people behave, and especially when a new technology greatly reduces the labor cost? Now, on the other hand, a platoon of trucks is really just reinventing a train; and so, some of us have wondered whether the world is really better off making it easier to operate, to drive a bunch of trucks, from let's say Los Angeles or Long Beach to Seattle or wherever, Denver, Colorado, or would everybody be better off by improving the logistics of rail transport, so you're no longer using trucks on that long distance, long haul. There are good reasons to be skeptical of a transportation market that accommodates long-haul trucks, when from infrastructure cost perspective, and a labor cost perspective, and an energy cost perspective, it's an order of magnitude cheaper to make the same deliveries by rail or by marine and maybe we're just not doing a good enough job, arranging for the terminals and pricing the highways to encourage shippers to use this more efficiently.

I think to mix metaphors that ship has sailed in the United States and you can see different decisions being made in Europe; but in the United States, I think they've already decided that, for instance the transition time from long haul to short haul is zero in a truck. It instantly goes to local delivery whereas with a train you have to have marshaling yards and extensive operations, same with container ships. Do you have any ideas about where the long-haul trucking industry may go?

Right. Well, I mean, as we discovered with this little pandemic that we've enjoyed the last few months, certainly shipping is an important part, an important but often overlooked part of our lives and our jobs and so, I'm certainly, a great advocate of efficient logistics, and certainly self-driving trucks could save a lot of money. It's an empirical question though, how much demand there is? How much efficiency you actually gain? How much demand there is, and to what degree, as you mentioned in Europe, the transportation system, the freight, the logistics transportation system is oriented more toward rail and here in North America, we are not; we rely much more on trucking. Now, the trucking industry is a lot very concerned about things like that they're having trouble attracting enough employees and there are a number of reasons that industry might be going under through some transitions and it's pretty much... if you're concerned about climate risks or you want to reduce climate emissions, it's very clear that shifting long-haul from freight to rail is very beneficial and so... I mean put it into perspective, heavy freight, heavy trucks represent less than 10 percent of all vehicle travel but they represent about 30 percent of all fuel consumption and emissions and they happen to be the current generation until we get all this electrified. Diesel trucks are particularly bad for human health, [with] the diesel particulates. So, there are some good reasons to ask should our technological efforts be focusing on how to automate trucks or should we be willing to invest at least as much to make the shipping, the whole logistical systems more efficient? And so we have less long-haul truck travel and there are way too many variables in that for me to predict how autonomous trucks will affect overall costs and in a more efficient market how that would shift from truck to rail. But, to me, that's the way we should be framing this, we should not start with a conclusion, with a technology and say isn't this wonderful that these self-driving trucks are going to reduce labor costs. We should be asking, what's the cheapest way to get a container from... say Long

Beach to Denver, Colorado or whatever, considering all costs and considering all technological capabilities. And I suspect if we were more rational that we would be investing more in these incremental logistical improvements, as they are doing in Europe and Asia, rather than assuming that self-driving technologies are going to save us.

And that may be a consequence of the actors involved in a free market, like the United States, where you have a truck company that's looking at "how do I reduce my costs," which are mostly labor and then looks at automation because transitioning to sending freight by rail is just not their business and the only way that that would change would be through some kind of government incentive.

Well, yes or no. I mean ultimately, are we interested in the interests of the trucking companies or are we interested in the interests of the shippers? The shippers should be indifferent; they want a container to get from Long Beach or whatever to say Denver, that's all they care about. They should be pretty much indifferent as to what technology does that and so, I do think, it is very legitimate for... as we're doing... say you're the U.S Department of Transportation or the BC or the Canadian Transport Canada, and you're trying to do some envisioning and you're trying to decide where your research dollars are going to go, I would recommend that you spend at least as much with these incremental improvements in logistical operations as you do improvements in self-driving trucks. One is hardware, the other is more software and hardware always looks better in a glossy photograph. So, there's a tendency for us to get really excited about things like self-driving trucks, and it's hard to get people excited about tracking systems with RFID coding and things like that and yet it's possible that the tracking innovations and the logistical innovations are actually where the best return on the dollar is.

I've heard a terminology for infrastructure that is termed V2V and V2X, vehicle to vehicle communication, vehicle to infrastructure communication, like the possibility that the stop sign could talk to your car. And it doesn't get a lot of attention in autonomous vehicle discussions, but, is that something that is being developed, at say regulatory agency levels or municipalities. Is that something that could creep up on us?

Well, there's a huge debate in among the technologists about this very issue, that is, should each self-driving car manufacturer develop self-contained systems, where your car has everything, it has all the sensors, it has all the location technologies, it has everything and so, say your Ministry of Transportation or Department of Transportation, has no role in making this happen; or is this a partnership, where let's say the signs and the signals and the markers are all redesigned to facilitate autonomous technologies? And there's a standardized communication system between self-driving cars and according to some ideas, pedestrians and bicyclists would have to have a little transmitter that identifies who they are, you know, identifies their location and what type of vehicle they are. So, your car would know that is not really a kangaroo, that it's actually a child walking around the kangaroo costume.

Let's see them do that for deer. By the way, my Tesla visualizes a deer as a combination of person and trash can, which are the things it knows about, that's what it shows on the display.

Exactly. So, I mean, admittedly we're at the very cutting edge. Tesla's autopilot is truly a pilot project, an experimental pilot project and so it's understandable that there's some... let's say some kinks in the system that - perfectly possible that they'll be worked out. On the other hand, they'll always be unpredictable circumstances and the human brain is far more sophisticated than any computer when it comes to these kinds of unexpected experiential conditions. So, maybe you could use -- people talk about machine learning and conceivably every time there's an error, the system will learn from that error and upload the error code, you know, the history of what caused a problem, every time it crashes. Okay, it's possible that you will learn. On the other hand, just in terms of for example safety, safety is just one aspect of all this. In terms of safety, autonomous vehicles do reduce some types of risks and the optimists say oh yeah, 90 percent of all crashes are caused by human error, autonomous vehicles will eliminate 90 percent of all crashes, the roads will suddenly be super safe, ignoring all the new risks that autonomous technologies introduce, including software failures and hardware failures and hacking and changes in the way people behave when they feel safer, so, people take more risks. And the additional vehicle travel. So, your self-driving car, you know, if it's cheap to drive, you're going to be sending it on all kinds of errands. So, it's going to drive you to work and then you'll send it rather than paying for parking, it'll drive home and park at home. And then at the end of the day, it'll drive back to pick you up. So, what used to be two trips, you driving to work and then driving home, now become four trips. So, you've just doubled kilometerage, the number of kilometers driven per day, simply because you have this self-driving car and you're a cheapskate, save on parking and as a result, even if the risk per kilometer is lower, it's very likely that autonomous vehicles will increase total crashes because there'll be all this additional driving.

In the same way that there are a whole bunch of Ubers circling around the city at any one time, like ants.

Sure.

I want to wonder though whether there are environments, where the autonomous vehicles will be safer much sooner. Like right now if I had to drive in the middle of the night from Salt Lake City to Denver, I think I would probably be safer if I turn on the autopilot in the Tesla.

Sure. You can design a system to be very efficient and, in this case, very safe under specified conditions, under very limited conditions. The more important question is at what point you will feel safe for your car, when you're going out to a pub or a bar, that your car will drive you home after a night of drinking and that is one solution, one optimistic solution to impaired driving problems. Of course there are other solutions. For example having a living in a neighborhood with a local pub, so which is the classic solution to drinking and driving is, you live in a walkable neighborhood where there's at least one nice neighborhood pub nearby. Okay, so there is a good question whether the idea that your car can drive you home is going to encourage some people to organize their lives around more driving and the car chauffeuring them home and you think of all kinds of other situations, where your self-driving car is going to encourage you to live a more automobile-dependent lifestyle, or are we better off with a more accessible, less automobile-dependent lifestyle. And should we glamorize this idea that we're all going to live out in an automobile dependent suburban, urban fringe location and our self-driving cars will be

part of that lifestyle. Another concern that I have is the inequity of that solution. So, pretty much by definition, autonomous vehicles will only be affordable to fairly affluent people until we have a full network of self-driving taxis and even then, based on my research, your robotaxi will still cost between say 50 cents and a dollar per vehicle kilometer. It's not going to be super cheap. Micro taxis, where you're the... let's say a van a 10 or 15 passenger van will stop and pick you up and then go on pick up another passenger and then drop you off and then drop off the next passenger, that could be as cheap as say 35 cents, maybe even 25 cents on, really good routes, on routes where there's a lot of passengers being picked up and dropped off. But, there are a whole bunch of inherent inefficiencies to all of these, including all that deadheading. So all that entire vehicle travels with the empty vehicles. So, when I do the calculation, what does it cost to own and operate a taxi and do the cleaning and the maintenance and earn a little profit, a current taxi is about two dollars a mile or two dollars a kilometer, that's what it costs you, if you call up at your local taxi now. Ride hailing like Uber and Lyft are say 20, 30 percent cheaper. So, it's going to be a dollar fifty, a dollar forty per kilometer under good conditions and your robotaxi will be somewhere around 50 cents, 60 cents, 70 cents a mile and under some circumstances maybe a little bit more. It is only affordable, if you're a low income, so you're earning, let's say you're in the first or second quintile. So, you're earning less than 50,000 dollar a year here in British Columbia. The self-driving car is only affordable if you have a robotaxi and you're only using it for about two thousand annual kilometers. But, if you were to live an automobile dependent lifestyle, for one thing, you would just own your own self-driving car. Because you're living in an isolated area, if you were calling up taxi all the time. If you live where I do in one of the urban centers you could call up a taxi and have expect to have it at your front door in less than five minutes. But, if you're living in a suburban or rural area, it could easily be 10 to 15 minutes and occasionally it'll be 20 or 30 minutes before it can get there because of relatively low demand and the limited routes from one rural area, there's not a lot of the network, the roadway network is not very complete. So, most people who live in suburban and rural areas, who can afford it, will own their own self-driving car, simply for convenience's sake. There's also a bunch of other things, most people they leave a bunch of stuff in their car, maybe baby seats, sports equipment, racks...

Yes.

Safety equipment, things like that. Your kid's favorite toy, they're all in the car. If you were to rely on self-driving taxis, you'd have to be moving all that stuff. So, you're going to have your own self-driving car; that's expensive. So that's going to be fine for affluent people. But, if you're a lower income, if you're earning less than the median income, it's going to be a stress for you to own a self-driving car, at least until 2040 when a lot of these are available on the second-hand market. And so, my point is, it will not eliminate the need for lower income people to live in less automobile-dependent areas. If you are low income now, you want to live in a walkable transit-friendly area. So you don't drive as much and when your car does break down, you have some alternatives and in the future when they're a bunch of self-driving taxis, it's only going to marginally change that equation, and you will still want to live, if you're low income or have other constraints and if you just don't like... well, if you like walking, you still want to live in walkable urban neighborhoods. So, I suspect that, I think that there are some important social

equity issues here, when governments are allocating resources, they're saying, we're going to spend this much money on developing the self-driving car technology or we're going to spend all this money on a special signage and RFID signals, on intersections or we're going to spend a lot of money on autonomous vehicle lanes. By all rights they should spend more money on the affordable, to improve the affordable forms of transportation, so that low income people are not being left out.

Well, I'm thinking that compared to the hype that we've been talking about and counteracting here that these are relatively minority views or at least they're relatively quieter views. Do you consider yourself an evangelist in that respect? You're trying to write a wrong?

I'm certainly not an evangelist and I am not anti-technology in any way.

No, that's not where I was going; but counteracting the hype.

I think that autonomous technology advocates, many of them are living in a bubble surrounded by other autonomous vehicle advocates. And it's perfectly understandable, if you are a roadway engineer or a venture capitalist or a software engineer, if you're living in Silicon Valley or other technology centers, and you're either fairly affluent yourself or you're starting off and you're aspiring to be affluent and so you're reading all of the literature, Wired magazine and all these pro technology messages, you have heard a lot about the optimistic perspective about how soon this technology will be available, how affordable and beneficial it's going to be, how safe it's going to be. If you leave that bubble, if you talk with your elderly mother-in-law, or your local affordability advocate, or people concerned who have other priorities in environmentalists concerned about emissions and sprawl, you're probably going to hear a good degree of skepticism. Most of those people have not -- their skepticism is visceral -- they have not done the research and so a lot of people are still accepting the optimistic predictions. The Tesla image that electric vehicles are the solution to climate change and that Autopilot is very soon going to be offering all these wonderful technologies and that pretty soon we're going to have self-driving taxis. So, even skeptics, a lot of them have heard this stuff, and they're a little skeptical but they haven't really researched it. I've done some of the research... I think my analysis, it's not anti-technology or anti-autonomous vehicles, it's simply the realistic objective comprehensive analysis.

And that's exactly what we try to do and want to do on this podcast is, not advocate for any particular position but say, "Well, what's the truth of it?" And there's certainly a lot more hype and opinion, uninformed opinion when it comes to autonomous vehicles than just about anything else in AI. So, I really appreciate your sharing your realistic evaluations with us. How can people who are listening to this find out more about what you've been doing and follow your work?

Sure. Well, visit our website, the [Victoria Transport Policy Institute](#) and you will find for free, my report called "Autonomous Vehicle Implementation Predictions: Implications for Transport Planning," and that summarizes my research on this particular subject. And then my new book 'New Mobilities' looks at not just autonomous vehicles but a dozen new or emerging

transportation modes and services, and looks and does what I consider to be the most comprehensive analysis of their benefits and costs and implications for our future, for the future of our lives as individuals but also of our communities. So, you can find out more information at our website. If anybody has any questions, I'm happy to respond to emails, so <mailto:litman@vtpi.org>.

Thank you very much, Todd, for shedding light on a subject that has got thousands of voices trying to be the loudest ones in the room and the truth is often a casualty in some of that, especially with the amount of money at stake in much of this. So, I really appreciate your helping us get that extra insight into this.

My pleasure Peter, thanks for inviting me.

That's the end of the interview. Okay, so no zombie kangaroos this week, but I found that incredibly useful in understanding just where autonomous vehicles are with respect to policy – or where policy is with respect to them – at the moment. What about you? What do you think? Do you see people making bets on AV deployment that you think just aren't going to pan out?

In today's news ripped from the headlines about AI, in a more down-to-earth application of AI to transportation, Velodyne Lidar announced that it will deploy a LIDAR-based traffic-monitoring system to a dangerous intersection in Austin, Texas, as part of its Intelligent Infrastructure Solution. LIDAR is a version of radar that uses lasers instead of radio waves to construct high-resolution 3-D maps of the area around the LIDAR unit, and is used in many, but not all, self-driving vehicles. The system will create real-time 3D maps of roads and intersections, replacing the current combination of inductive loop detectors, cameras, and radar. Velodyne will install LIDAR sensors to monitor traffic, beginning with the intersection of East 7th Street and Springdale Road. Velodyne says this location's accident history and fatality risk, along with the prevalence of speeding and congestion, make it an ideal place to start. This is the sort of more advanced infrastructure that might end up communicating with the vehicles around it with the V2X technology we mentioned in the interview.

Todd's website, again, is VTPI.org.

At the time of recording this, the Olympics are in full swing, and so I am thinking about the ways in which AI could be used in sports. There are so many possible applications from monitoring and increasing the gate attendance at events, to helping with the coaching of athletes by looking at how they can improve their performance and what they do that works and what they do that doesn't. It's all a matter of collecting the right data, and in sports, you have so much data available. So it just illustrates how AI can get into any field today. And I didn't even mention betting on sports, and heaven knows, AI has got to be all over that already.

Next week, I'll be talking with Sathish Sankarpani, who is head of data science for Orbital Global, in Suffolk, England. He is the mastermind behind Orbital's VirtTuri digital avatar, and I'll just tell you that its name is a contraction of Virtual Turing. Find out what that means next week on *AI and You*.

Until then, remember: no matter how much computers learn how to do, it's how we come together as *humans* that matters.

<http://aiandyou.net>