**Robyn Dowling – Driverless cars: are we ready?**

>> Welcome to the Podcast Series of "Raising the Bar Sydney". Raising the Bar in 2017 saw 20 University of Sydney academics take their research out of the lecture theatre and into bars across Sydney all in one night. In this Podcast you'll hear Robyn Dowling's talk, "Driverless Cars: Are We Ready?" Enjoy the talk.

[ Applause ]

>> OK, thanks Louie for the great introduction. I'm feeling a bit on my own. I'm looking at everyone with their red wine and their beer and it's like, OK. But I was also thinking, how many red wines has the people at the back actually had? And did you drive here tonight? And if you did drive here, because we're all very sensible people -- well, that's an assumption but are we all very sensible, what is our plan B? How are you dong to get home if you can't drive home tonight? Perhaps you're going to get a taxi? I've got a taxi here today and I have to admit the driver was very adamant that Tony Abbott was the best thing that ever happened to Australia. So I don't want to get a taxi home. Or is your plan be someone you've come with? My plan B is standing over there having a beer so I don't think that's going to get me home. Or perhaps, I can think about the plan B of 10, 15 years in future? So I'll grab my phone, I will text my car and I'll say, "I want to go in 10 minutes", I won't say, I'll just do something on my phone. And then 10 minutes later wander downstairs and there it is, my car pulls up. In I hop, sit in the back, grab my phone, catch up on email and it takes me home all without me driving. No crappy taxi driver and straight to my front door. I want to think about tonight about how realistic might that be? How, not only realistic but is that what we want? Do we want to be able to just stand here in the bar, have a great time, and then just have this car wandering around and come and pick us up whenever we want? So you know, is it realistic and do we really want that to happen in our cities? And if we do want that to happen, what do we need to do now? So there's lots of all this stuff about, you know driverless cars or coming, they're coming, or they're not coming, everyone's -- and it's like but we've got an opportunity, I think because I'm an urban planner, is that we've got on opportunity now to do something and that's what lots of research is about. So I though I'd quickly say, what do we man my driverless cars? So there's technology people, and I'm not a technologist, I'm a social scientist, they say that there's -- I've got this spectrum of what they call levels of automation. So we can start with level zero over here. At level zero is when Henry Ford designed his Model T. It didn't even have electric or electronic ignition. You had to crank to start it and brakes and hand signals and everything. So that's level zero. Level one is about where we might be now and level one is where we have some automation of our cars. So some of you might have nicer cars than what I do that will do reverse parking for you on its own or beeps when you're on the highway when you're going across the lanes. So it's like some automation that the car is telling you how to drive. Level three automation is when the car actually does drive on its own. So it's got computer systems, cameras, all this other stuff that I don't know about because I'm not an engineer, that will keep it on its track, on a course, it will keep it from running into something and it will get you home on your own. But the different -- at level three you always have to be in control as a driver. So it needs a driver there just in case. So it's a bit like, I don't know if many of you have taught your children to drive, it's a bit like when they're sitting in the front seat and it's just like pretending that you've got the steering wheel and the brake. And that's what it would be like in level three. Level five is that scenario I started with where the car does everything. You can actually sit there and just do whatever you like in your car. And it's level five that is more controversial. And that's where all the carmakers and robotizes, I don't know some of you were here before we were talking robots, that's where they want us to end up. And I'm confident, you know, they're throwing so much money at it and so much brain power that we'll get there. But the question is will the rest of us get there? Will the way we think about driving get there? Will our cities actually be able to cope with those sorts of cars? And that's the question about, you know, as a society the key question is can we get there or do we want to get there and what will that consequences be? So there's a couple of -- so I thought I'd just sort of take you through some of those sorts of -- you know, are we ready? Are we as a group, as a society? So are we legally ready? So I don't know if any of you -- although I m fairly confident none of you got here by a driverless car today. And one of the reasons is that -- it's amazing statistic, there are 720 laws and regulations that need to change if we were to have driverless cars on our roads. So for example, did you know that some of the regulations are saying things like the driver cannot be in control of the vehicle if it has a person or an animal in its lap, That implies a driver has a lap. If the brake lights are not working on a car, then a driver has a responsibility of doing hand signals. I haven't seen a driverless car with a hand. Or that you can can't actually register a vehicle in Australia at the moment, if it doesn't have a rearview mirror. And again, if we've got a driverless car it's surrounded with cameras So it actually really doesn't need a rearview mirror. So there's all these laws that are just sort of assumed that a driver is a human. That makes sense because until now drivers have been humans. And law is actually not very good at regulating computers. Like how do you regulate an algorithm? Or those of you that might remember the computer Hal in 2001 about what happens when a computer goes a bit haywire, it goes off script, does things, thinks it like a human. It's going to be quite problematic about what we're going to do legally. We are on the way though. So in Australia, and most of the stuff I know about driverless cars is from Australia, so in Australia you can actually have a car driven by a computer at the moment. And you can have a permit to do that, to test it, because we need to understand how they're going to work. So you just need a special permit that says, yes you can have this car, it can operate autonomously if it has a driver. A bit like the level three I talked about. But we're actually getting strange situations. So there's this interesting case in the U.S. where an operator got a permit to operate a driverless car and what I wanted to do is I wanted to understand how pedestrians would interact with a car without a driver. You probably, I don't know if you're familiar at all but there's lots of discussions, you know, are pedestrians going to play chicken with the car? I mean are they, you know, step in front, is it going to stop or not. And so this is a research project trying to figure out whether that was going to happen. But there was a slight problem. They couldn't undertake the research unless the car had a driver, but they wanted to test a driverless car. So what they did was they disguised the driver as a seat. And so it's like you're standing there thinking, oh that's a very big tall seat. And I have to admit I don't know what they found. But I do know that there's all that. That we do need to sort of roll them out slowly, slowly, slowly to test all those interactions so that our laws are sort of slowly changing about driverless cars. But then, you know, law road rules, all those things. But what about insurance? That's a classic thing that people talk about. So if us as drivers we take responsibility when we get behind a wheel, or we might have insured our car in other ways, but if there is no driver, who's responsible if it has an accident? Is it the computer company that developed the software that's driving the car? Is it the component manufacturer? Is it the car manufacturer? Can you imagine General Motors taking responsibility for all the accidents that it's cars cause? So there's all sort of -- insurance companies are actually being very clever about this at the moment, and again it's a bit like legally we're getting there. It's like insurance companies and insurers are getting there in that what they're doing is they're thinking, well we won't insure the driver, we'll actually insure -- maybe we will insure the components. So the set of cameras supplied by a particular company. And because they're so data connected and they know exactly what's happening, if that component manufacturer gets insurance for its component, and we know if it fails what the consequences would be. So if there's an accident you can actually pinpoint it to be like the Black Box on the aeroplanes can pinpoint what the problem is and that maybe that's where the liability is -- lays. But it's all a bit of a mind field and I think that people are just starting to think about that. Again with insurance is becoming a bit more connected because our current cars are producing data in ways that they didn't do before. We haven't quite connected Black Boxes into cars, but I think insurance companies would like to start collecting information on how many kilometres we drive, when we drive to try and sort of make a connexion about different ways that we can insure ourselves. Now what I'm interested in because I'm an urban geographer is that well are we ready socially for a driverless car? And again, you know, is it that some people perhaps because we're in a very inner city environment I might not be talking to these people but, you know, for some people driving is actually a really pleasant pastime. Whether that be the thrill of acceleration, you know, racing off at the lights with your friends, we think about teenage or young people. But even more broadly, classically in the U.S. in the 1930's freeways were built for the purpose of beautiful driving trips so that they would be freeway not like our concrete jungles that we have now, but it would be through countryside with vistas and the whole idea is that you would go out in your car and the act of driving and being there was a really important experience. So you know, are we ready to give up driving? What the research shows is that some people are really ready to give up driving. So young people, and I'm saying this a not young person, in Sydney for example, people age 20 to 24, only half of them have driver's licences now. It used to about 80 percent. So there is this sense that driving doesn't hold that appeal that it may have certainly when I was growing up and certainly not for my -- yeah the generation of the -- the current generation tend to have different -- they have lots of different ways of getting around. Cars are more -- well, cars aren't necessarily more expensive, they're more inconvenient. But also there's different status symbols. Some research I did quite some time ago now really confirmed, we talk about right, if a young person is going to save up a $1,000, $1,500, rather than going to buy a car they're going to buy a iPhone X, because that will give them credibility with friends, that's what will keep them connected. They don't actually need to physically go somewhere else. So there is this sense that you know, maybe that transition to being the thrill of driving, to being in control of a car might -- that might be on the wane as well. But on the other hand and if I think about -- we don't also -- we drive for social reasons and often the -- some other researcher did as away that the car itself within it is a bit like a microcosm of the living room or the dining table. And that's especially around chauffeuring trips that parents do with their children. And I'm sure some of you have spent a fair bit of time driving children to sports or whatever it is, or their kids to parties or whatever. And what the research shows is that sort of taking your kids somewhere is certainly a pain in terms of activities and time and everything, but what the research also shows is that it's actually a really interesting social space. And it's a surprisingly safe environment to have conversations, particularly with teenagers and that's partly because they can't get out of the car, that's it stuck there, but also because they don't need to make eye contact. Because hopefully you as a parent are facing the road. And if they don't make eye contact that's actually a less threatening situation. So rather thank I know if I sit there at dinner table and say to my 16-year-old and look at him and say, "What did you do today?" "Not much". And I'd say, "Oh, and what did you do at cricket?" "Not much". But if I was in the car with him or especially if he's in the car with his friends and I'm driving, I learn an incredible amount about what's going on in his life by their interaction. So there's a sense in which, well how might we replicate that social space of the car if it is that, you know, I grab my phone or he grabs his phone and just sort of calls the car to get him and go wherever he wants. Like I will be superfluous sooner than I would like, but you know, we'll have to find other opportunities to interact or to figure out what's going on in his life.

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>> But finally a little bit of another antidote to that is that we know that driverless cars are actually going to be so much more safe than our current cars. So in the U.S. last year, 136,000 people died in road or road related incidents, which is more than the people who -- number of people killed by gun violence. In Australia is was 1,300 people died on our roads. And when you think about it as car dominated societies we actually have an incredible tolerance for injuries related to cars. And because driverless cars take out most of the human error that is related to accidents, they actually will be safer. Trucks will be safer. Lots of the current experiments are around what people call platooning the truck so that you'll have trucks travelling at the same speed that is a set distance between each other. So that, you know, there will be no erratic behaviour, they'll just have one lane of the freeway all to their self. So there is sort of this incredible way that we might need to make the transition to driverless cars for our own safety and also for those people who at the moment like elderly once they reach 80 and fail a driving test, what do they do? And driverless call well they can still access a car. As well as people with say vision impairment can't legally drive at them moment, there might be opportunities. So it's sort of -- there's lots of pros and cons but I think there's sort of this -- there are signs that we are getting towards a driverless understanding. And that brings me though to well, we all live in a city. We're all from Sydney. We all live in a pretty complicated urban environment when you think about textures and levels and climate, etcetera. But our -- and that's where our driverless cars are going to be rolled out really because that's where the population and that's where they're needed. But how many of you get frustrated when your phone drops out or when the NBNs not working again. We've got -- the Wi-Fi's not working. Your GPS thinks that I'm in the Trinity bar, it thinks I'm in the bar up the road rather than in the Trinity bar. Like it doesn't know where I am. Or your GPS, you're in your sports car and the GPS says, "Go from A to B by going over the dirt road with lots of rocks". And we know that all those systems they're actually quite fallible at the moment. But driverless cars need all those systems to work perfectly. So they need GPS, they need satellites, they need Wi-Fi, they need cameras everywhere. They need -- I've been reading about people talking about people talking about putting sensors in buildings. We need amazing Wi-Fi coverage because it's about -- driverless cars need to communicate with each other, but more important they need to communicate with what's around them. So whether that be not just traffic lights with the road and so what that means is that they also need really precise locational devices. So the -- it's no use, so if the driverless cars thinks it's 10 centimetres away from the crash barrier, when in fact it's at the crash barrier, it's not going to help anybody. It really needs an accuracy that doesn't exist in our cities at the moment. So when, you know, a car and I'm also talking about the car as a -- you know it's got agency, it's going to do all these things, but you know, it needs -- a car needs to tell the difference between say a bollard and a child. It might be about the same size but they're very different. Or it needs to tell -- in needs to know when the white line on the road has got oil on it. it's still a white line and it needs to follow it. There's a whole sort of really quite intricate and again not being an engineer it will figure it out, but it is our urban environments are really complicated textures, and colours, and heights, and it's just going to be really a big -- well, it's a big ask really. So what's happening is that lots of governments are thinking, oh dear we need to test our urban environments. And so just this year alone there's been more than 100 trials of various types of driverless vehicles around the world. So some of these things like we know Uber or Tesla actually are putting cars on roads in California and Pittsburgh, sometimes openly, sometimes with a subterfuge. Apparently, one of my students was telling me today that if you go for a test drive in a Tesla, if you go to the right place they'll put it on automatic autonomous mode for you, yeah?

>> They did it.

>> Yeah.

>> I didn't know they were going to do it.

>> [Laughing] So you know, there's all those sorts of things going on. They're typically happening in the U.S. there because carmakers are desperate to do it. There are sometimes some of the tests are run when they close a road or a section of road to test a particular bit. There was a famous -- the first driverless car trial in Australia was 2015 in South Australia. And Volvo came out, and they only tested a couple of kilometres of road, but the reason why they wanted to come to Australia and I'm hoping they didn't use real animals, is that they wanted to test kangaroos. Because kangaroos are quite, we know they are distinctive animal, but they're distinctive in their shape and that they bounce. Not many animals bounce and the car needs to think about -- how does the car recognise this bouncing thing on the road? So that's, you know, close the road, test something quite particular. There's actual testbed lots of them in the U.S., Michigan is deciding that because Detroit is no longer the car city, we're going to become the autonomous car city. So they've got this testbed that is apparently booked out for years in advance particularly by Chinese car makers. And so you bring your car and you sort of -- you either go around a racetrack or you've put particular things in place. And apparently they're very proud that they have got a car to go around the racetrack at racecar speeds. So that's thinking whoa that's great we can now have autonomous racecars that will make the Bathurst 500 an interesting experience. But so there's lots of those, lots of tests, but there's also some real world tests. So your South Whales, we're always at the forefront of this, we only just announced our first trial a couple weeks ago. Adelaide have had some for ages. So there's -- I don't know if they've started yet, the City in Olympic Park, they're trialling some driverless shuttles. And those sorts of precinct trials, Adelaide Airport's got some, lots of airports around the world. Lots of university campuses are trialling driverless shuttles. So they're happening as well and I think, you know, how are we going to put people on and off these? Where are they going to go? So there's a fair bit of testing going on there. But that means though that we need urban planners, because you know as planners we like to decide what goes where, how tall something will be, what it will look like. And there was an interesting study done on urban planners in the U.S. last year. And so it started by looking at long-range transport plans, so 30-year horizon transport plans for American cites and it found none of them mentioned driverless cars. So it was clearly not just even a year, not on the horizon for transport planning. So this academic said, oh this is a bit bad, so then when it interviewed actual planners, presumably those who've been responsible for writing the plans. And what he found is that they actually new all about autonomous cars but they were quite paralysed in the sense of like, well there was so much uncertainty well how are they going to reach cities? Who's going to implement them? What are they going to look like? But they just didn't know what to do. And they also though that transport had had so much disruption in the last five years. So if we think about, Uber has come on the scene in five years has really turned, you know, ride sharing and taxi systems upside down. In this state it's only the last five years we've got proper apps for on time on demand sort of information. We've only just got our smartcard. But all those technologies that are transforming transit means that the transport planners are a little bit thinking, oh that we don't know how things are going to go. So they are at the moment in some U.S. cities are just thinking, oh we'll just wait and see. We'll see how this goes. I know all of you are fascinated so you all read the Greater Sydney Commission's report on the weekend that said, this is how Sydney is going to be. Well, I did a quick check courtesy of my word find. They are -- we are anticipating an autonomous car future or driverless car future in Sydney. We haven't been quite concrete about how we're going to do it, but we do know that it is on its way. And what we do know about how it's going to shape our cities is around parking. So it is widely accepted and understood that autonomous cars, driverless cars of any sort will reduce the need for parking in cities. Either because the cars could be more efficient at parking or they could do stacked parking in basements because they can drive themselves in or out. You don't have to open doors, so the space between cars can be less. It might be, and in an ideal world there would be fewer cars on the road, or it could be that we've got more shuttles and other things. So that we do know that parking requirements will reduce. And that's a great opportunity for the people who are starting to draw images reclaiming streets or reclaiming, you know, a shopping centre car park. If you can get to a shopping centre in a way other than your own little car, imagine you can sort of reclaim, put a playground, put a soccer field on a car park. We could repurpose multistory car parks into affordable housing. So there is an opportunity if we don't have as much parking in on our street or in our garages, there's a whole -- we could rent out our garage on Airbnb, there's lots of things we could do. And that -- and this sort of brings me to my final sort of wrap up, but it really depends, I think, on what decisions we make about what city we want to live in. So there's two scenarios people talk about with driverless cars. One they talk about is really -- is what they call private autonomy. And by that they mean that we just continue on the way that we as a community are which is car focussed. The predominant way that we get around is through individually owned cars and the difference is that this time they're just -- we don't need to drive them. And if we don't need to drive them that means we can commute for longer because the commute is more pleasant. You can really do work for 2 hours. It could also mean that we get more cars rolling and rolling and rolling around the city wondering, it's like -- you know, if I want to get my driverless car home it has to be somewhere while it's waiting for me to finish raising the bar. So there's a concern that if we just sort of think, yeah, well we're just going to switch our current vehicles for driverless ones we'll just increase congestion and not address any of the problems that we have with the car. But then there was another solution that people are talking about and there's glimmers of that in the moment and that's what people talk about clean or green and shared. Now I know Australia is problematic electricity system but maybe in 20 years time we will have a predominantly renewables electricity, so these will be electric. Most of the research is showing that autonomous cars are actually going to be electric. And then they can be shared. So some of these shuttles that we're seeing be developed where the ride share, car share, there's all this sort of opportunity to use driverless cars in these new modes of transport, new modes of on-demand transport. And then if you connect them and this is where I'm getting really -- a bit Utopian but still hopeful, if you connect them with really flexible and reliable and frequent mass transit, then the driverless bit makes connecting say from your home, to the train station, your home to the bus, that actually makes it more economically viable and hopefully more likely. So if I was to return to our, what is your plan B? Assuming that we still need it or I'm going to need a plan B after this. So yes, you can get home without driving. But ideally it won't be ringing up your own individual car. What it will be is that you'll just go to Uber and the driverless Uber will pick you up out the front and take you home. Or there's a GoGet around the corner,, I'm sure there's many GoGet's around here, cash share vehicles. The car share will be a driverless one, so you just go and get your car share to go home. And I think that's the future that I think we need to be planning for. Thank you.

[ Applause ]

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