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THE CHALLENGES OF THE MARCH TOWARDS AUTONOMOUS VEHICLES

Interview of Andy Palanisamy
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By Nicolas Miailhe

In this interview, Andy Palanisamy walks us through the dynamics and challenges associated with the rise of self-driving vehicles. He also discusses the limits of the technology in addressing 21st century mobility needs around the world.

Andy Palanisamy is a seasoned technology, public policy, and strategy professional with over 16 years of multi-sector experience. After spending well over a decade leading and supporting various technology research initiatives for the US Department of Transportation, Andy is taking a leadership role at Ford Smart Mobility. He brings a deep understanding of technical and public policy issues associated with cutting edge transportation/mobility tech initiatives such as autonomous/connected vehicles (pretty much everything under the umbrella of Intelligent Transportation Systems). Andy is also heavily involved in the development and mentoring of next generation transportation leaders through his roles at Young Professionals in Transportation and as the Director of Mobility – The Future Society at Harvard Kennedy School. Andy finished his Bachelor of Engineering (Civil) degree in India before moving to the US in 1997 for his Master studies at West Virginia University. He recently earned a Master in Public Administration from the Harvard Kennedy School.

KEYWORDS

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- **MASS TRANSIT SYSTEMS**
- **AUTONOMOUS VEHICLES**

Nicolas Miailhe: How do you see the timing of the rise of AVs and their massive deployment and what are the key challenges (robotics for vehicles seems mature unlike in the case of humanoids)? We talk a lot about 2022 as a key threshold: what do you think?

Andy Palanisamy: First let me caution you with these kind of projections. Because there are several components to this. One is the evolution of technology; the other one is the policy. Technology seems to be maturing much faster than policy. There is a lot of momentum behind the development of the autonomous vehicle technologies (AV), be it in the Silicon Valley or in the traditional manufacturers around the world such as in Detroit here in the U.S. or in Munich in Germany for instance. And probably too much hype over their capabilities and the development trajectory across autonomy level, from 1 to 5 (full autonomy). What is sure is that from an industrial perspective, 2020 is literally around the corner considering that manufacturers are already planning the production of the models which will be rolling out in 2018. So I think we are seeing a clear disconnect between the picture that the media is painting and what the reality is!

That said, the march towards autonomous vehicle will be relatively slower. And you will certainly not see Level 4 and level 5 vehicles coming into consumer market right away; it looks more like 2025 and 2030. There are very few players working in the level 4 & 5 space which require the mastery of an entire informational eco-system beyond the vehicle itself (i.e., Waymo). You see, the frontier between research and certification for road deployment at scale may be blurred by the big media attention but it is still there. And of course the insurance industry willingness and ability to adapt to this new paradigm will also be a key driver of the market penetration pace. Including in terms of how they are going to work out the configuration and prices of the transfer of liability away from drivers! Frankly a lot of questions are still unresolved regarding liability coverage and getting a green light for a pilot or small scale deployment of a few thousand vehicles is vastly different from market standardization affecting hundreds of millions of vehicles! So we should remain prudent.

Therefore I believe we are likely to see an incremental introduction of these vehicles with varying levels of autonomy on the market, starting with certain market segments which offer more favorable conditions. The first one would be urban transit and freight where scale and corporate management of fleets will facilitate risky investments and complex transition; while it may be more difficult for individual vehicles.

N.M.: It's more and more argued that the best case (especially on the economics side) for a mass dissemination of AVs is individual cars in cities (where ride sharing meets self-driving to enable "mobility-as-a-service") despite big apparent challenges posed to AI challenges (traffic density and diversity): do you agree and why so?

A.P.: Well, I partly agree and partly disagree. I agree with your hypothesis that cities, with their density, scarcity of space (especially parking) and plasticity (including in the consumption's habits of their citizens!), offer an ideal environment from an "economy of scale" point of view. This environment could enable the right articulation between AVs and ride-sharing business models to provoke a drastic drop in cost of miles travelled. But one of the key assumptions of mobility-as-a-service, or MaaS, is automation powered by AI and robotics. That includes traveling but also planning, dispatch and payment. And that's a challenge. Unifying payment systems and data sharing systems for instance will not be easy, because of competition. Achieving this will probably require harmonization at the national or regional levels. Same for creating the favorable incentives and regulation whereby the right eco-system emerge enabling several providers to operate side by side without toxic monopolistic situations.

N.M.: What are the key challenges? We often hear about the difficulty to bring all actors and stakeholders around common standards, especially on the sharing of data. What are the key obstacles to the establishment of data commons: competition dynamics? The fact that most ride sharing companies are not listed which gives opacity a premium?

A.P.: Stakeholders' ability to create a data commons –that is a standardized protocol to share public and private data- is indeed going to be a key part in that equation. And it's not going to be easy. At least in the U.S. context! Unifying payment systems is already a challenge so I let you imagine the challenge of orchestrating a meaningful collaboration between all big players. And let's not underestimate disparities in terms of expertise between large metropolis and small cities to deal with these issues. Public-Private Partnership can help fund and accelerate the needed capability-building to modernize & digitize transit agencies by leveraging financial markets and taxpayer money. What is really important in my view is to position the customer experience at the center of everything because if customers feel the friction, they will go back to what makes their lives easier, that is driving their cars, which they have been doing for so long!

N.M.: To what extent can the rise of autonomous vehicles and of mobility-as-a-service support the ecological transition and reduce carbon emissions?

A.P.: There are two schools of thoughts on the environmental question. One school basically says that when AVs come to maturity,

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we'll be able to run transportation systems in a much more efficient way, minimizing traffic jams and reducing carbon emissions. The other school says that with the cost of travelling dropping, then people will travel around more. That's why it's so important that the transition towards AVs and MaaS coincides with the shift to cleaner platforms, such as electric vehicles to accompany the rise of renewable energy sources. But there will be investments required by cities to adapt their infrastructure including for charging; otherwise the adoption will be slow.

N.M.: How about other labor intensive cases besides personal transportation, where municipalities could save money such as waste collection, delivery by drones, but also to some extent ambulances, and perhaps even fire fighters?

A.P.: On the medical side, some communities are experimenting the use of drones to deliver medical supplies between hospitals such as fluid samples. In Iceland, they have started to use autonomous drones for freight delivery since at times the distance over water is much less that on road. Para-transit systems for non-emergency situations are also good candidate for the use of AVs to cut costs and allow more disabled people at effectively have access to the service.

N.M.: The US is far ahead of any countries worldwide in terms of AI while many U.S. cities suffer from a chronic lack and/or obsolescence of mass transit systems: do you think that this paradox makes US cities ideally placed to lead on the revolution of AVs?

A.P.: Public transit systems and agencies in U.S. cities are indeed chronically underfunded. Even in New York for instance. And most of the innovation in transportation in the U.S. is still driven by private companies addressing single-occupancy vehicle needs. So we haven't really innovated on public transportation systems if you ask me. Because we are not investing! We need to rebalance this and that's not going to be easy because levying taxes is never an easy thing to do in in the U.S.

N.M.: And so to address that challenge, what should be the articulation, role and split of competences between cities, metropolitan areas, States and even the federal government (esp. on R&D funding, product/solutions standardization but also subsidies to large projects)?

A.P.: That's a great question and certainly our federal system generates fragmentation which does not always serve the cause of standardization and facilitates upscale of viable solutions. Better articulating the contribution and responsibilities of the various stakeholders from the local to the national is certainly critical. That said, we have had a quite successful tradition in the U.S. where the federal government is capable of mobilizing long term patient capital for high-risk, i.e. disruptive research and development. National security has often served as a conduit for this. The Defense Advanced Research Agency (DARPA) success story in particular has become a model in articulating productive cooperation between the federal government, academia and the private sector which other countries are trying to emulate now to spur disruptive innovation. I have heard that President Macron is even proposing to create an equivalent for the European Union! With DARPA, public money has been used to seed a number of technoscientific breakthroughs and industry domains including autonomous vehicles. The "Urban Grand Challenges" it held in 2004, 2005 and 2007 (Nota: this event required teams to build an autonomous vehicle capable of driving in traffic, performing complex maneuvers such as merging, passing, parking and negotiating intersections) is widely acknowledged as a breaking point for the rise of autonomous vehicles. It generated a lot of competition among the best brains in the country and beyond; it also generated great collaborations between some of the best Universities in the country and auto-makers. And therefore, as a whole, that effort accelerated the development cycles of autonomous vehicle technologies a great deal. In 2015 and 2016, the U.S. Department of Transportation somehow borrowed the "Grand Challenge" concept from DARPA and led a "Smart City Challenge". There, the goal was not only to galvanize the industry but also to incentivize cities to step forward and form consortium with private companies and academia to develop and test disruptive urban transportation systems including autonomous & connected vehicles whereby vehicles and the infrastructure talk to each other. The Challenge clearly created a conduit for new forms of public-private collaborations. It was a big success and is somehow emblematic of a good articulation of responsibilities between the national and local levels, between the private and the public with the objective of transforming transportation systems using the latest technologies. 78 cities applied; 7 were selected as finalists and worked intensely with the DoT to refine their project. The City of Columbus, Ohio eventually won and will receive up to $40 million from DOT and up to $10 million from Paul G. Allen's Vulcan Inc. to supplement the $90 million that the city has already raised from other private partners.

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N.M.: I was a bit shocked to see the failure of Bridj (a Boston based start-up specialized in micro-transiting solutions through an innovative public-private-partnership model) which simply folded its business without been bought out or recapitalized: given the buzz that had surrounded this innovative model, what signal does it send and what lessons should we learn from Bridj promise and ultimate failure? To succeed and scale does micro-transit requires AVs?

A.P.: Bridj tried to stay afloat and looked for possible acquisition from Toyota for instance I think. This failure has indeed shocked a lot of people in the industry because it was a very promising public-private-partnership model. So indeed it probably discouraged a lot of other promising ideas. It also goes back to how we do business in the U.S. If you are going to ask from people to give away their car and use transit instead, you need to provide an equivalent level of comfort and service. And as I understand, unfortunately Bridj failed to convince users on this and also lacked volume. And so it became quite difficult to run a profitable business on this basis. It's also a question of timing and relates to the low price of gasoline in the U.S. which surely played a part in this story.

N.M.: When you look at global mobility needs in the next 10-20 years, especially in emerging countries like India or the African continent, do you think that self-driving cars are the solution? Or to be precise... to which extent are they part of the solution?

A.P.: Well, there is a very simple reality that we cannot evade which is that there are inherent limits to road transportation efficiency potential versus rail for instance which can move thousands of people at one time and buses which can move hundreds. At the end of the day, betting heavily on self-driving cars will require putting more cars on the roads and building more roads which might not be the most efficient solution. So it's very important not to delude ourselves regarding the added value of self-driving cars vis à vis other modes such as mass transit systems like rail. When large volumes are required because of continuing demographic growth, mass transit offer a much higher potential in terms of consolidated cost and also carbon emission! If our 21st century is going to be a century of urban explosion, AVs are not going to be the "killer app" to address massive mobility requirements in emerging countries, such as in South Asia or Africa. To run effectively, AVs need top class road infrastructure, which is not often easy to find in emerging countries at the moment. And the cultural factor is important too. I mean we are struggling in the U.S. to shift the culture away from the 20th century model of individual cars to shared use and it's difficult! In many emerging countries, the shift is going the other way around (Win part driven by viewing car ownership as a status symbol) and that's not necessarily a good thing because bus, metro and tramways offer higher efficiency potential.

N.M.: We could even say that misrepresentation of the real potential of AVs could lead to cannibalization or delaying of other much needed large mass transit projects (e.g. new metro lines) which require large investment and almost systematically government subsidies and thus fiscal efforts... In other words, by inflating the potential of self-driving cars, aren't we running the risk of de-incentivizing public investment & fiscal effort?

A.P.: I totally agree with that! Hyping up the potential of AVs has a social cost and can be really counter-productive, especially in the long run. We really need governments around the world to invest much more on public transportation regardless of the potential of AVs. In short, an AV-based mobility ecosystem will be way more effective when it is paired with a robust public transportation offering, at least in the urban areas. Self-driving cars can act as good complement, for instance to cover the last mile or last few miles but they cannot be the back bone of mobility systems... at least in urban areas. Singapore is a great example of this. They are clearly seeing AVs as a complement. You cannot see Singapore without its public transportation systems. Same for Hong Kong or Paris. And the same should really apply to New Delhi, Dhaka, Lagos and the rising metropolis.

N.M.: And that's particularly important given the U.S. soft power and influence in the world, particularly in spreading the Artificial Intelligence & robotics revolution and its associated organizational models, business models and collective imaginaries. I mean the model of the "motorized middle class model" (with the associated urban & suburban sprawl) exported from America into many counties of Europe and now China, India and Africa is simply not sustainable, even with electric cars. We know it! So aren't we in a way simply rejuvenating it and trying to foil it again with new clothes, those of AI and robotics?

A.P.: Well... that's sometime the impression that I have looking at a company like Tesla and the socio-technical imaginary it's putting across so brilliantly. They have become iconic of the shift from combustion to electric engine but their model is still deeply ingrained in the individual car model which is not sustainable for the reasons we discussed before. Public education around the real challenges and possibilities of these technologies really matter. We need more public policies on that too to make public transportation become a way of life and diminish the status symbol that cars represent. This shift has already happened in a number of cities like in Paris for instance. Engineering that shift is not easy and it takes time. It can result from a combination of public education, tax and market incentives delivered on the long run.