



Regional Mobility Dialogue Series: Results and Summaries

Can Technology Save Us?

May 22, 2018

Leonard Transportation Center, CSUSB

Sponsored by:

HNTB

Introduction

Traffic congestion and its related environmental impacts are driving the development of new transportation technologies that will improve the quality of life for residents and improve the overall economy. If we listen to the hype, it seems that technology will fix all of the problems related to transportation. An obvious question results; can technology save us? There are various challenges to consider with respect to regulations, certifications, infrastructure, travel costs, air traffic management, safety, and psychological barriers. The May 22 Dialogue Series convened a wide range of professionals from industry, government and academia to address the real possibilities and challenges of technological advances in today's society, particularly as they relate to transportation.

This Dialogue included four guest speakers:

- Jason Pack, Principal, Fehr & Peers,
- David Embrey Pickeral, JD, Strategic Advisor to Mobility Innovation and Smart Cities,
- Thomas Allen, Sales and Marketing Executive, Phoenix Motorcars, and
- Matthew Burris, Deputy City Manager of Rancho Cucamonga, who served as the moderator.

According to these experts, the future is increasingly bright for innovation in transportation technology as society develops faster and smarter solutions for reducing our flights, drives, and rides. Many of these solutions have the potential to disrupt current economic conditions, which means it is crucial to be on the lookout for new transportation technologies and assess their potential for affecting economic development.

Opening Statements

For this Dialogue session, each of the panelists was asked to address three issues:

- What are the main challenges that technology is bringing?
- What are the benefits of new transportation technology?
- What is the call to action?

Jason Pack began the discussion with the three revolutions of transportation that are occurring. The first is the electrification of fleet. This is not something that will happen overnight and an issue that comes along with electrification is, if all vehicles are electric what does this mean for gas taxes? Without gas taxes, the public funds to

Jason D. Pack, P.E

Principal – Inland Empire and Orange County Area

FEHR & PEERS

• Three takeaways:

1. **CHALLENGE:** The UC system has referred to the massive disruptions in the transportation sector as the Three Revolutions of Transportation – (1) Electrification of the Fleet, (2) Shared Fleet Economy, and (3) Autonomous Vehicles. How do we manage this moving forward on our transportation networks and in our fiscal models?
2. **BENEFIT:** These disruptions will fundamentally change how we move people, goods, and services. Depending on the model that emerges, there could be significant benefits gained through these revolutions.
3. **ACTION:** We need to start planning for this now as competition for public spaces (like curb space) becomes increasingly competitive. This will also change some of our public financial models that we should all be prepared for.



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needed to manage and maintain our transportation infrastructure will disappear. This is one of the unintended consequences of electrification.

The second revolution is what the transportation industry calls the shared economy or the shared fleet. Mr. Pack shared information from a recent presentation by Hasan Ikhata, Executive Director of the Southern California Association of Governments (SCAG), in which Ikhata stated that “Ten years ago the number one ride hailing service was Yellow Cab and today it is Uber. Uber has ten times more cars than Yellow Cab had and Uber owns zero of those cars, so if you think about that from a shared economy perspective, we have a totally different economy that has taken place.”

The third revolution that is fast approaching is the autonomous vehicle fleet. There are many unintended consequences that need to be considered. Fehr & Peers has conducted several studies on vehicle fleet penetration and asked what percentage of a fleet has to be autonomous before we start realizing capacity benefits in the system? Mr. Pack and his associates also researched induced travel and found that when we make it easier and cheaper for people to travel, they tend to drive more. Autonomous vehicles essentially enable that.

David Pickeral described the call to action for governments and industry to work closely together and collaborate to find solutions to transportation and technological challenges. Mr. Pickeral was recently in Northern California meeting with City of San Francisco staff in a building located about a block away from the Uber’s headquarters. Even in such close proximity, the City was surprised

almost every day by Uber’s next move. Mr. Pickeral went on to say, “That era is kind of over and it is going to be necessary for government and industry to sit down and figure out how they will actually co-exist to deliver services together. Right now 32 out of 34 largest transit properties in the United States, everyone except Seattle and Houston is losing ridership, to the tune of 8-12% loss in ridership. So they are losing horrendous amounts of government money. Combine that with the fact that Uber lost 4.5 billion, with a B, dollars last year. The situation is certainly untenable, the action is screaming for everyone to sit down; government and industry with the help of academia is essential.”

Thomas Allen started with what he believes are the benefits of switching to zero emissions vehicles. “It gives cities and private companies the ability to mute local, state and federally mandated climate action plans. Obviously it improves the air quality.” Phoenix Motorcars vehicles, which are class 4 – medium, heavy-duty class, about 14,500 pound vehicles – will save roughly 60 solid tons of carbon dioxide per year. Along with this are operational, fuel and maintenance savings. The opportunity to market clean technology to future generations of environmentally concerned patrons is needed. If a solution is

David E. Pickeral, JD

Independent Advisor, Entrepreneur and Board Member of several companies; Reston, Virginia

• Three takeaways:

1. **CHALLENGE:** Technology is often developed in the abstract (creating a solution that then must then find a problem) and lack of standardization leading to “one off” or stovepiped systems that cannot scale
2. **BENEFIT:** Technology has an unprecedented and growing ability to ensure the safety of the public, and also achieve significant value for both public and private investment through ensuring efficiency and interoperability
3. **ACTION:** Government, industry and academia must agree on an integrated framework around planning, funding, procurement, operation, standards and regulation that is both workable near term and forward looking



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offered, ridership will go up. The main challenge of electrification is with budgeting, especially for cities. Budgeting for the incremental costs; how do we implement and adopt these new technologies? Infrastructure planning is also needed. Where do we put the chargers? What kind of panel upgrades do we need and what kind of power do we need to service our vehicles? Also researching the incentives and funding opportunities that are available today.

Thomas Allen Sales and Marketing Executive at Phoenix Motorcars



• Three takeaways:

1. **CHALLENGE:** 1) Budgeting, Implementation and Adoption of New Technologies 2) Infrastructure planning and utility coordination 3) Researching Incentives and Funding opportunities for ZEV's and Charging Stations.
2. **BENEFIT:** Ability to meet local, state and federally mandated climate action plans; Improved Air Quality; Creating local jobs; Operational, Fuel and Maintenance Savings; Opportunity to market clean technology to the future generations of environmentally concerned patrons, private companies and communities.
3. **ACTION:** Education: helping fleets, municipalities and transit agencies to become aware of the ever growing incentives and funding specifically tailored for the adoption and integration of zero emission vehicles.



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Mr. Allen believes the call to action is to better educate the public on the opportunities available to them. “At Phoenix Motorcars we try and educate all of our potential customers on the incentives that are in place; what funding opportunities are out there. We help design and implement charging stations, drawings, permits, and also show them the different types of state and federal funding that’s available for infrastructure in particular.”

Roundtable Discussion

Matthew Burris began the roundtable by asking the panelists what are the big shifts in transportation related technology that the public should be paying attention to?

“From a bigger picture, I think about how we plan our transportation system, a lot of that is done through our regional Metropolitan Planning Organization (MPO), and at the MPO level we are doing a variety of modeling and analysis to try and help us identify what that infrastructure needs to look like in the future, make sure we have funding to deliver it, and ultimately make sure that we are meeting our air quality conformity standards” said Pack. He went on to discuss the role of SCAG and asked if SCAG’s current model accounts for transportation network companies like Uber and Lyft? “We are seeing increasing mode share related to TNC’s (Transportation Network Company) beyond transit, we’re including transit in our MPO models, but we are not accounting for TNC’s as a trip purpose in and of itself. To my knowledge very few travel models are doing this if any,” continued Pack.

The next question from Matt Burris focused on why these changes and issues are happening now, what problems are we trying to solve?

Thomas Allen believes the main concern that cities are having now is improving air quality. “It’s sad to say, one of the reasons that California has one of the greatest state incentive programs out there, is due to the bad air quality, and the need to fix it. We work hand in hand with all the major air quality management and air quality control districts, and they put out maps yearly indicating toxins in the air – NOx and CO2 levels. There is a real push to try to improve the air quality, especially around schools and

other parts of cities, ports, and disadvantaged communities.” Phoenix Motorcars solution was to provide a product that would work and integrate easily, using already built up technologies.

Jason Pack believes there are additional drivers along with air pollution regulations that are creating the need for solutions. One is the time and hours spent sitting in our cars. Pack explains, “Basically having an hour and half of just sitting in your car having to pay attention, and taking that hour of time that you could have been spending with your kids, or at work or being productive, instead of focusing on the car in front of you and making sure you don’t ram them. That’s a big motivation as far as some of the opportunities that the private sector are seeing on how we can change the value of somebody’s time in the car.” Furthermore, Pack thinks the final motivator is safety. “If you look at the economic drivers behind insurance in the United States and collisions, there are lives and dollars to be saved there.”

Burris noted that none of the speakers had touched on SpaceX, Hyperloop, drones or anything else in the way of new technological shifts, and asks the speakers their thoughts on those topics.

From David Pickeral’s perspective, we have spent the past 100 years building the highway infrastructure and it is not realistic to just jump straight into building a Hyperloop system. “We can’t just go, okay guys let’s just build The Boring Company, let’s tunnel under LA instead of driving through it, let’s build a Hyperloop to Vegas, let’s do all this other stuff. There has been a 100 years of investment in the highway infrastructure and nobody can walk away from that right now, so we need to make it more efficient.” As far as autonomous vehicles are concerned, Mr. Pickeral fundamentally believes they will not decrease traffic, however, he thinks they will greatly decrease parking, and a third of urban space is used around the country for parking.

When it comes to traffic congestion, Pack thinks there is technology readily available today to help solve these issues, but it has not been implemented in California as of yet. “One that I want to touch on, there is a software platform or an algorithm that was developed in Australia commonly referred to as VicRoads. Essentially what they have done is looked at their freeway system and realized that when you have a hot spot, you need to start managing traffic ten miles upstream up of it, and start looking at the number of vehicles that you have accessing your system there and start taking it back and managing your flows.” According to Pack, through this management system they are able to raise their congested throughput from 1,300 vehicles per hour, per lane, to around 1,900 during congested timeframes.

Fehr and Peers research on autonomous vehicles found that once we get about 50 percent of the fleet autonomous, we start to see significant improvements in capacity. Much of this deals with headway, which is a component of capacity and is related to the distance between cars. Essentially cars are able to follow closer together because autonomous vehicles have better reaction time compared to human drivers. Autonomous do not overreact, whereas a humans often do. Where humans tend to slam on their brakes, causing a ripple effect upstream on congestion, the more controlled and smoother braking of autonomous vehicles avoids this. “Right now if my company is billing me out at 100 dollars an hour, and I’m sitting behind the wheel not able to bill my time out because I’m driving. But if all of sudden I can take that hour and be on my lap top and generate a report that I can bill out at 100 dollars an hour, the value of time in the car changes. So the cost of driving essentially goes down when you start looking at automation of the fleet, cost of travel per mile is going to go down,” said Pack. When we start taking these factors into consideration, and the cost factors, cost of driving and traveling start to decrease, we may see increased traffic volumes. This is called induced travel demand. “When we make it cheaper and

easier for people to drive, guess what? People drive a lot more. That is where we get into the VMT increases that we talked about, people will just drive more because it's easier," continued Pack.

The speakers also discussed their concerns, what they are excited about, and what cities should do in response to new opportunities.

Mr. Allen is excited that utilities are helping with the electric infrastructure buildout. Phoenix Motorcars is providing feedback on how to implement a rate structure to avoid peak demand charges and obstacles related to electricity in the future.

David Pickeral indicated that many people ask how will we do these things and how will we pay for it? His response is that the money is already there to achieve smart mobility. "What needs to be done, is create a business model where governments are able to realize substantial cost reductions using technological innovations, like TNCs, for on demand transit. I worked for the Washington Transit Authority, we were making 40 percent return on the dollar for fare bucks (how much you make back as a transit agency) for our bus system and we were the highest in the country at the time. No single transit agency that I am aware of in the United States, at least actually makes money now. They make about 20 cents on the dollar now, 40 was really good, so they are losing about 80 percent of their return and getting back 20 cents. In many cities, it is really more like 12-15 cents on the dollar. "

Simultaneously we have Uber and Lyft using millions of private investor dollars. Pickeral believes where the innovation can happen is for transit agreements between government and industry so that instead of losing 80 cents on the dollar, they would only lose around 60 or 70. This would generate revenues for the private sector and more efficiently use public sector dollars. "That can actually happen fairly quickly; we don't have to build a new system and that is where the revolution needs to start," explained Pickeral.

In regards to electrification, there was a question from the audience about what can be done to deal with problems in the electric grid infrastructure, and possible cyberattacks.

Mr. Allen responded by saying, "The electrification of fleets, we are only talking about it because battery technology has gotten to the point where we can actually store enough energy in a vehicle and let it run significant amount of mileage before needing to charge again. I think with that technology we are seeing as far as in battery systems, hopefully in the future, we will be able to see utilities think of new ways to store the energy."

Matthew Burriss added that solar technologies are getting better along with the deployment of renewable generation technologies, and a key component of that is on-site storage. "In some ways vehicles represent an opportunity to help balance or add some resiliency to the system by transferring energy and storing it in those vehicles. In other cases we have looked at deploying batteries and generation onsite," said Burriss.

Another guest mentioned that, in the 80's, there was a lot of research involving solar powered vehicles and wondered if this has continued and if not, why?

Mr. Allen responded that one of the biggest benefits that solar can offer electric buses would be to combat the usage of air conditioning. Air conditioning units, particularly on shuttle buses, take around 10-15 percent of the range. So far, solar for shuttle buses has not proven cost effective.

A guest asked the speakers if, to date, there has been a notable impact on the quality of the air in Southern California and if technology has already made our lives better or worse.

Matthew Burris recalled as a kid in elementary school there were smog alert days, when the kids could not go outside because the air quality was so bad. “That is far less of an issue now, the problem is not solved of course, and kids that grow up in the Inland Empire still have a much higher instance of asthma, respiratory related diseases, our life expectancy here in the Inland Empire is less and part of that is related to our poor air quality,” said Burris. He goes on to discuss how the logistics industry as well as small vehicle operation play a big role in contributing to the poor air quality. Burris believes that the impacts are still localized, for example many of the cities in the Inland Empire, at the 60 freeway and the 15 interchange, the Mira Loma Village and the Ontario area has some of the worst air quality in the country. “You start seeing the same kind of rates of pollutants and health implications, so yeah we have come a long way. I think that the technology that has been developed to help California address this problem has carried over throughout the rest of the country and other places in the world, and the electrification of vehicles will substantially help that. Will efficiency impact quality of life? My take on it is yes. Sometimes impacts are beneficial and sometimes they are not, so I do not know if we are going to see a net benefit or not, and as Jason mentioned when the time value of transportation decreases, it is going to be far more easier to spend more time in cars,” said Burris.

When we think about parking, a large quantity of land would become available if an autonomous fleet became a shared fleet. Mr. Pack did a presentation with Rick Willson, a professor at Cal Poly Pomona, one of the world’s leading experts on parking. “Rick used a statistic that there are six parking spaces for every vehicle owned in the United States, so if you think about the average cost of a parking space being \$8,000, and you multiply it by those extra five spaces that are not utilized at any moment in time, that is a large portion of land that can be utilized,” said Pack. With that in mind, Mr. Pack believes the quality of life will increase once changes in land use occur, and we start seeing modifications in parking. “So instead of having big giant parking lots or parking structures throughout some of our downtown areas, I think those are things that are going to be redeveloped and create different opportunities to improve our quality of life,” concluded Pack.

Moving the Dialogue Forward: Ideas from the Participants

After the presentations, Dialogue attendees discussed the ideas presented and worked together in groups to discuss solutions to move the discussion forward. The top three ideas from each table have been categorized and summarized below.

More development on electrification of vehicles. There were a number of questions and considerations regarding the transition to electric fleets.

- Upgrading of electric grid, charging system and storing power
- Determine funding source for charging stations, power generation improvements, and address long range travel, example, for trucks
- Smart road concepts
- Electric vehicle incentives
- Develop ideas to compensate for losing gas tax revenues, and address social justice impact of vehicle miles traveled

- Holistic view of energy and pollution. Determine how much electrification decreases pollution when taking into account coal plant pollution, waste/pollution associated with manufacturing batteries
- Discuss how agencies will handle the significant increase of capital and operating expenses caused by electrification, mandates are already affecting buses despite not having industry/technological solutions available

Cybersecurity and the risks that come with new technological advancements. Many participants were interested in learning more about the dangers of cyberattacks and how to secure our transportation systems.

- Tackle cybersecurity issues brought on by new technology
- Security issue a major bottleneck. No one will accept new technology unless they are comfortable with security aspects.
- Cybersecurity aspect of autonomous cars
- Cybersecurity and how much of the population will be able to move towards autonomous vehicles
- Develop regulations to prevent security breaches, consider impact on lesser skilled jobs that will no longer be needed
- Anticipate new technology being obsolete by the time government adopts them.

The repercussions associated with the adoption of autonomous vehicles. A few attendees were curious what the implications would be from implementing an autonomous vehicle fleet.

- Consider risks associated with today's jobs impacts, there is almost 200,000 logistics jobs at risk due to autonomous vehicles
- If autonomous vehicles become a shared fleet, think about what to do with all the cars owned by Americans
- Research different connected/autonomous sharing models
- Discuss upcoming issue of when autonomous vehicles take over and make driving easier, it will result in more cars on the road.

The Leonard Transportation Center (LTC) at California State University San Bernardino (CSUSB), presented a bi-monthly dialogue series on topics relevant to the future of transportation in the Inland Empire. The series, which was open to the public, was sponsored by HNTB Corporation and was held every other month starting in February 2018.

Dialogue topics ranged from understanding the current mobility dilemma and its causes to potential solutions like congestion pricing, transit; emerging technologies such as autonomous and connected vehicles and new ways of funding transportation infrastructure. Attendees had the opportunity to hear from transportation experts and engage in vigorous discussion about the transportation challenges facing the Inland Empire.

About Leonard Transportation Center

The Leonard Transportation Center (LTC) at California State University, San Bernardino opened in 2006 with a focus on regional transportation needs. The vision of Bill and Barbara Leonard was to create a center that focuses on the unique transportation opportunities and challenges the Inland Empire faces. Today, the LTC is working to expand its research and student engagement programs. Focal points include transportation management and governance issues, development of new technologies, and transnational studies. Their vision is to work collaboratively to seek solutions to assist residents, businesses, government and nonprofit agencies, and international partners to work together on improving sustainability and quality of life in the Inland Empire. For more information, visit www.csusb.edu/ltc.

About HNTB

HNTB Corporation is an employee-owned infrastructure solutions firm serving public and private owners and contractors. HNTB's work in California dates back to its founding in 1914. Today, HNTB continues to grow in size and service offerings to clients in California from seven office locations, currently employing more than 350 full-time professionals. With more than a century of service, HNTB understands the life cycle of infrastructure and addresses clients' most complex technical, financial and operational challenges. Professionals nationwide deliver a full range of infrastructure-related services, including award-winning planning, design, program management and construction management. For more information, visit www.hntb.com.