



FUTURES¹ GROUP

GREATER PHILADELPHIA

Memorandum 6

Merge Ahead: How Will Automated Vehicles Affect Vision Zero?

Wednesday, June 19, 2019

9:00 AM – Noon

DVRPC Offices

190 N. Independence Mall West, 8th Floor

Philadelphia, PA 19106

Visit <https://www.dvrpc.org/LongRangePlan/FuturesGroup/>
for presentations and related meeting handouts

WELCOME AND INTRODUCTIONS

The meeting was called to order by Barry Seymour, Delaware Valley Regional Planning Commission (DVRPC), who delivered the welcoming remarks for the day. Mr. Seymour introduced the keynote presenter, Sam Schwartz, President and CEO of Sam Schwartz consulting, and former NYC Traffic Commissioner.

KEYNOTE PRESENTATION

The keynote presentation by Mr. Schwartz discussed future challenges and opportunities with AV technology, drawing from his new book *No One at the Wheel: Driverless Cars and the Road of the Future*. Mr. Schwartz framed the discussion of how to prepare for automated vehicles by harkening back to the advent of the automobile at the turn of the twentieth century and the unintended consequences that its introduction to the road network had, particularly for pedestrians and their access to the street. Mr. Schwartz advocated for a stronger public response to the introduction of automated vehicles that protects the rights of pedestrians and averts the worst possible outcomes.

Mr. Schwartz emphasized important differences between the reality and hype around the benefits of automated vehicles. For instance, he nuanced the idea that automated vehicles will be safer by asking what trips they are replacing; if other car trips, they are safer, but if transit trips are the ones being replaced, they are not. Mr. Schwartz offered some advice on how to ensure that automated vehicles are a benefit to our transportation system, including integration with public transit, private investment in the road network, and establishing an automated vehicles street typology plan.

Questions/Comments:

Connecting People, Places & Prosperity in Greater Philadelphia

The Delaware Valley Regional Planning Commission (DVRPC) fully complies with Title VI of the Civil Rights Act of 1964 and related nondiscrimination statutes in all activities. For more information, visit www.dvrpc.org/GetInvolved/TitleVI.

- In response to a question on increasing private funding for public transit, Mr. Schwartz cited microtransit as a major opportunity for private involvement in the industry. He also called out so-called “lemon socialism” whereby the public sector is saddled with running only unprofitable routes (versus routes like the Hamptons Jitney).
- Mr. Schwartz acknowledged an audience member’s concern about how pedestrians will communicate with driverless vehicles, noting that solutions proffered thus far are imperfect. He pointed out that interactions between automated vehicles and bicyclists are an even greater challenge due to the speed and unpredictability of bicyclist movements.
- Andrew Besold, Montgomery County Planning Commission, asked if some of the greatest benefits of automated vehicles will be in more suburban and rural, rather than urban, settings. Mr. Schwartz agreed that especially for people with limited mobility, automated vehicles offer tantalizing solutions, but integration with public transit is critical.
- Vukan Vuchic, University of Pennsylvania, reinforced the point that the hands-off and largely accommodating approach to planning around the automobile has had hugely negative impacts on the livability of American cities. The same mistake must not be made with automated vehicles.

LOCAL PANEL DISCUSSION

A panel discussion was moderated by RSTF Co-Chair, Kelley Yemen, City of Philadelphia. Panelists included Dr. Megan Ryerson, University of Pennsylvania, Roger Cohen, Pennsylvania Department of Transportation, Sarah Clark Stuart, Bicycle Coalition of Greater Philadelphia, and Steve Buckley, WSP. The panelists explored what a future with AVs might look like, and the challenges and opportunities it presents for enhancing safety. Panelists also evaluated different regulations needed to create equitable access to AV technology and how to integrate AVs into the region’s current infrastructure and traffic flow. For instance, panelists cited the need to price automated vehicles so that they don’t compete directly with transit.

Key safety issues panelists identified included autonomous takeover (transitioning between automated and driver control), ensuring autonomous vehicles can pass a basic vision test, and having faith that they are safer than conventional vehicles—a bar that is constantly rising as automated features are added to conventional vehicles. At the same time, panelists noted the tension between the need for safety standards without slowing the innovation in and introduction of features that will significantly reduce crashes. In one real world example, Mr. Cohen explained that Pittsburgh officials requested a top speed of 25 mph for driverless vehicles being tested on city streets, but PennDOT ultimately refused the request after their study established that such a cap would create safety issues due to variable speeds on the road.

The panel also discussed equity issues around automated vehicles, citing concerns that the price point for vehicles will be such that certain population groups will not be able to access them, as well as fear that the vision technology automated vehicles use will not recognize darker skins. Mr. Buckley predicted that shared vehicles (a generally desired outcome) will never account for more than a segment of the vehicle mix and only where they are profitable to operate. In response to audience questions, panelists discussed how public input should be incorporated into the planning process around automated vehicles. Ms. Stuart emphasized the need to ensure that bicyclists and pedestrians are incorporated into automated vehicle technology development and testing. Others also highlighted the need for a robust public input process and noted that the current process lacks sufficient opportunities for the public to weigh in.

SCENARIO EXERCISE & BREAKOUT GROUP DISCUSSION

After the panel, audience members broke into groups and discussed four scenarios exploring how AV technology could present itself in the future, and the safety considerations that should be made. Each group received a fictitious article, set in one of the four futures being imagined in the scenarios. The articles focused on AVs and safety issues related to them.

Figure 1. Four Scenarios Formed from Axes of Uncertainty

		Incremental Change	← Axis 1 →	Transformative Change
← Axis 2 → Political Will / Polarization	Collective Action	Strength in Numbers – Citizens have more say in the development and regulation of technology, their communities, the economy, and privacy. Focus is on deploying already existing technologies, as innovation has slowed.		Technopolitical Transformation – Citizens have more say in the development and regulation of technology, their communities, the economy, and privacy. Technological advances are actively directed toward achieving major societal goals.
		Delayed Expectations – Political uncertainty, slow innovation, and lack of direction leads to economic stagnation. Long-anticipated technologies have been slow to roll out after hitting a few bumps in the road.		Technology in the Driver’s Seat – The private market has increasing control over technological development & deployment, the economy, and how communities grow and develop. Automation has upended work, transportation, and many other industries, leading to considerable worker displacement.

Members of each group were asked to read their article and comment on the scenario. Facilitators then asked participants to answer the following questions, first on their own papers, and then with the group:

Question 1. What are the opportunities, challenges, or other implications for AV deployment and improving safety in this scenario?

Question 2. What recommendations do you have to better prepare for AVs and improve safety in this scenario?

Participants were able to respond to a third question on their own sheets in the case that additional comments were not discussed in the facilitated activity.

Question 3. Is there anything else you want to add to your own sheet that we didn’t discuss today?

Facilitators recorded the implications and recommendations with the greatest consensus and displayed them for the entire room to review. Those recordings are noted on the following pages.

STRENGTH IN NUMBERS

High degrees of collective action and political will attempts to give citizens more say in the development and regulation of technology, their communities, the economy, and privacy. A slowdown in innovation puts more focus on deploying already existing technologies.

Group Feedback

OPPORTUNITIES	<ul style="list-style-type: none"> • Adjustment period allows for public acceptance, industry to integrate safety concerns • ***Training: Operations, Vehicle Maintenance • IoT: data driven evidence to make necessary changes to improve safety, data fed back to driver • AI-loop • ***Policies: use local policy makers to your advantage • Public-Private Partnerships • Implement stage/step-by-step
CHALLENGES	<ul style="list-style-type: none"> • Mixing of human and AV drivers, especially around incident response • Lack of funding for AV-friendly road infrastructure (potholes) • Driver education: how to interact with AVs? • Education of AV drivers • Dedicated lane (funding) • ***AI Loop • Coordination of systems (agencies); data-sharing; policy alignment • AVs Interaction with people, non AV vehicles • Safety, hazard management • Longer platooning scenarios • Freight platoons' interactions with consumers • Technology glitches • Driver training • Public engagement to understand and influence technology
OTHER IMPLICATIONS	<ul style="list-style-type: none"> • Internet of things? • More leadership from DOT
RECOMMENDATIONS	<ul style="list-style-type: none"> • Explore ways to allocate space for truck platoons, (e.g. HOV lane reallocation or removing cars from truck lanes on NJ Turnpike) • Foster cross-collaboration between industry, policymakers, and emergency response so AVs communicate with incident response • Develop education campaigns/materials on how people should interact with AVs • Make the entire system operate as a single entity (like aviation) • Roll out slowly, adding obstacles one-by-one • clearly define liabilities • Match policy development with technologic innovation • Know human behavior and use that in policy/tech decisions • Ensure vehicle standards are met and enforced • Shared model ordinances and legislation with local and state governments • Separate travel lanes for AVs • Uniformity of regulations for roads with AVs, including bike and ped interactions • Only allow AVs on highways (no manually-driven cars) • All AVs need to pass robust pilot project. 1,000,000 miles and continued data analysis

*** indicates a major point of consensus within a given breakout group.

TECHNOPOLITICAL TRANSFORMATION

High degrees of collective action and political will attempts to give citizens more say in the development and regulation of technology, their communities, the economy, and privacy. An activist public sector is trying to direct fast moving technological advances toward achieving major societal goals.

Group Feedback

<p>OPPORTUNITIES</p>	<ul style="list-style-type: none"> • AV scooters and bikes might be lower cost and therefore affordable • Road butlers: Serve the people, not giving vehicles priority • ***Pedestrian priority/safety (mobile units might not respond fast enough) • Reduced crash rates (for vulnerable populations) • Increased mobility and access to jobs • Direct traffic: avoiding secondary and tertiary collisions • Increased funding • Last-mile connections
<p>CHALLENGES</p>	<ul style="list-style-type: none"> • It's going where there is money/demand, not necessarily need • Do we design for a mix of vehicles today or of tomorrow? • Sizing roads and infrastructure (complete streets will look different) • ***Updating and maintaining infrastructure <ul style="list-style-type: none"> ◦ What if infrastructure requires upgrades; is more expensive? • ***Has to be available; affordable; accessible. • ***need for backup system/redundancy (e.g. radar and satellite) to insure against machine and pedestrian fallibility • Need vehicles connected; able to recognize bikes and pedestrians (RFID tech?) • Need more federal regulations/requirements to produce Level 5 technologies • ***Need to sell rides; share rides • ***Maintain safety features • Incident management • ***Inequitable access: <ul style="list-style-type: none"> ◦ Who do AVs serve and who gets left behind? ◦ More "old fashioned" vehicles in poorer neighborhoods ◦ Policy & partnerships to provide AV access to low-income populations • Social acceptance • Exacerbating current issues with community engagement • ***cultural norms surrounding driving and how to integrate with conventional vehicles
<p>OTHER IMPLICATIONS</p>	<ul style="list-style-type: none"> • Efficiency/maintenance of vehicles • Must maintain connectivity (online wifi connection, radio frequency) • "Kill switches"

RECOMMENDATIONS

- Data:
 - Require AV companies to share data (if you want to operate, you must share)
 - Could AI solve non-transportation issues?
 - Could AVs monitor for potholes?
 - Balance freight with passenger needs
- Education, Evaluation and Engagement (EEE):
 - Meaningful community engagement (especially in "slow adopter" neighborhoods)
 - Education
 - Reflect and evaluate frequently
- Equity:
 - Ensure legislation is not written by the corporations
 - Low income communities don't walk because of safety issues, crime issues, etc.
 - AV companies need to provide pro bono trips
- Close more streets in cities to vehicles bigger than mini scooters
- Make infrastructure improvements in neighborhoods, micro grid, pods, complete streets
- Build AVs to work on existing infrastructure
- Change police forms to require data about AVs to be collected
- Comprehensive plan for implementation
- System needs to be adaptable
- Make safety consistent; technology trustworthy
- Regulatory framework: Federal: policy/direction, State: infrastructure, Local: enforcement/operations
- Financial incentives for low-income connectors (e.g., incremental tax, not all at once)
- Tax credit for replacing cars with AVs
- Real-time citizen reporting of near-misses
- ***Plan for competitive pricing models. Occupancy tax?
- Evaluate impact of AVs on existing transportation challenges
- ***Test safety
- Public-private partnerships
- ***Street typologies
- Dedicated curb space

DELAYED EXPECTATIONS

Polarization, political uncertainty, slow innovation, and lack of direction lead to economic stagnation. Long-anticipated technologies have been slow to roll out after hitting a few bumps in the road.

Group Feedback

OPPORTUNITIES	<ul style="list-style-type: none"> • ***Time to build a more comprehensive regulatory environment • ***More time for city to pivot policies to response to scenario • ***Improve conventional vehicle safety in meantime • Time to rethink the role of cars in cities more generally • Focus on trucks/freight • Conventional traffic calming treatments remain applicable, need for bike facilities remains • Improvements to overall network efficiency- reduced • Allows time to reflect tech • New developments (like Schuylkill Yards) provide an opportune testing ground
CHALLENGES	<ul style="list-style-type: none"> • If city resources remain constrained, won't put extra time to good use • ***Education for human system users (bicyclists and pedestrians behavior) is insufficient now and may be worse in the future • Current problems become more deeply entrenched, status quo inertia • Overreliance on technology, only look at tech which removes human checks • Public frustration and skepticism will slow roll out, leads to more opposition to AVs, fight with public involvement • Blending AV and traditional transportation culture • More research to make sure things work as they are expected to
OTHER IMPLICATIONS	<ul style="list-style-type: none"> • Should drivers license requirement be adjusted in response to more AVs? And interim CV functionality? • Mixed fleet is less safe • Equity issue: not everyone can afford an AV • Safety culture between age groups, more mobility for different age groups • May need to identify AVs to make others aware in mixed fleets
RECOMMENDATIONS	<ul style="list-style-type: none"> • Install more dedicated Rights-of-way • Comprehensive pricing incentives • Drop-off/pickup management with geofencing (delay = more time to manage) • ***State-level vision zero policy with teeth; safety first for policy framework • Speed governors/limiters, capping at speed limit everywhere • ***deploy 2019 technology on all cars • ***Focus on mass transit improvements for the tasks transit does well • More coordinated land use planning • Rigorous testing new tech and extensive public education & regulate • Insurance liability questions will abound in this scenario • Consolidation of powers will be an outcome, lead to single suppliers? • Microtransit services may do well in this future • Clearly marking AVs to signal others (i.e., student driver decals) • Education is more important in this scenario because we have uninformed adoption • Double down on transit. Improves safety, provides mobility and accessibility

*** indicates a major point of consensus within a given breakout group.

TECHNOLOGY IN THE DRIVER'S SEAT

The private market has increasing control over technology development & deployment, the economy, and how communities grow and develop. Automation has upended work, transportation, and many other industries, leading to considerable worker displacement.

Group Feedback

<p>OPPORTUNITIES</p>	<ul style="list-style-type: none"> • ***Modify Behavior away from vehicular centric • Freight distribution at a cheaper cost • Crisis will force tech to address these issues • Employ pedestrian priority at intersections, connect vehicles to signals • With robust data can do better analysis • Shift up in public funding for transit • Seniors and rural/suburban folks can have ongoing independence longer • Marketing and consumers can demand fully safer and autonomous vehicles • Create stronger data sharing standards and oversight by public or private • If tech reaches potential, improved goals • If deployment as fast as iPhone • Greater safety- driving at night for seniors
<p>CHALLENGES</p>	<ul style="list-style-type: none"> • What is standard to safety? • Coordinating all users/stakeholders and diverse group to help decision making • Privacy issues challenge • Dependency on technology could lead to more gridlock and time lost • Liability goes up for safety/data ... for everyone • Class could drive the market and greater disparity • How will perform in mixed AV environment? • Congestion • Domino effect of VMT • Potential exacerbated income inequality from congestion pricing
<p>OTHER IMPLICATIONS</p>	<ul style="list-style-type: none"> • ***Created reactionary society + cost to this scenario • ***Tech will not solve climate change; behavior must • System hacks and tax • Sprawl • Not better for all people/neighborhoods • How does interact with automated systems? • Kidnapping

RECOMMENDATIONS

- Separating modes, cyclists from cars to help AV navigate (i.e., protected bike lanes)
- Geofencing, speed limits
- Doing things in deliberate fashion better instead of quickly
- Define clear safety standard before AV hit roadways
- Require mandatory data collection in all AVs
- Reasonable government oversight for sharing data and reporting
- Learn from other cities' best practices
- Tax for roadway management- making good easy -efficiency quality safety bonuses for inclusivity
- Simplify driver tasks- standardization and simplification, smart design
- Hold manufacturers liable- for everything
- Regulate safety with universal standards for roadway and vehicle design that everyone can understand
- Education/driverless car training for everyone, how to operate/negotiate with them
- Prioritize movements through new symbols/wayfinding
- Prioritize more vulnerable users- not just body ability/mode but also by trip purpose
- Continue drivers tests- including vision
- Provide public with more information on actual benefits, not just selling/spinning
- Make goals and take incremental steps
- Make sustainable transportation fund for AVs to fund transit, safety improvements, etc. Virtuous cycle.

**** indicates a major point of consensus within a given breakout group.*

Jackie Davis, DVRPC, concluded the meeting with a brief summary of the breakout conversations and how the input will be incorporated into DVRPC's scenario planning work.

NEXT STEPS

DVRPC staff will conduct facilitated exercises with smaller focus groups to fill gaps and supplement existing feedback from the Futures Working Group. The scenarios will be used as platforms, to understand how key issues in the region's long-range plan could unfold differently between now and 2050. These issues include:

- Inequality
- Climate Change & Environment
- Transportation Technology
- Transportation Infrastructure & Financing
- The Economy and Work
- Development Patterns & Housing
- Demographics & Health

Staff will use the information collected in Futures Working Group workshops, focus groups, and other research to model and develop scenario narratives that will make up the Future Forces 2050 Report. Staff will share the draft report with Working Group members in the fall of 2019 and publish it in early 2020. Facilitated discussions on scenario recommendations will be incorporated into the strategies workshops held as a part of the 2050 Long-range Plan update.

Meeting Attendees List

Anastasiadis	Manny	PennDOT
Anderson	Kevin	DVRPC
Andrews	Brandon	City of Philadelphia
Arlt	Christina	DVRPC
Baker	Ammon	Signal Control Products
Bandiero	Tony	Eastern Pennsylvania Alliance For Clean Transportation
Barron	Carmen	
Beatty	Al	DVRPC
Besold	Andrew	Montgomery County Planning Commission
Bickel	Richard	Econsult Solutions, Inc.
Boyer	Michael	DVRPC
Brahler	Richard	Bucks County Planning Commission
Briggs	Robyn	PennDOT
Brown	Corey	Delaware County
Buckley	Steve	WSP
Callahan	Patrick	City of Philadelphia
Cerbone	Vince	PennDOT
Chao	Eugene	University of Pennsylvania
Clarke Stuart	Sarah	Bicycle Coalition of Greater Philadelphia
Clemmons	Michael	NJDOT
Cohen	Roger	PennDOT
Cossaboon	Bert	McCormick Taylor
Davis	Jackie	DVRPC
Dobson	Dana	City of Philadelphia
Dula	Justin	PA Department of Environmental Protection
Edinger	Tom	DVRPC
Elkis	Patty	DVRPC
Engel	Grant	SEPTA
Fleisher	Michael	Traffic Planning and Design, Inc.
Fraser	Will	Clean Air Council
Fusco	Brett	DVRPC
Gorini	Marco	DVRPC
Graff	Robert	DVRPC
Gruswitz	Ben	DVRPC
Gutierrez	Maya	Research & Evaluation Group, PHMC
Hayes	Bert	
Hayes	Eva	City of Philadelphia
Hester	Ian	DVRPC
Hicks	Robert	Delaware River Port Authority
Hillengas	Amory	Philadelphia Department of Public Health
Hincken	Garrett	Center City District
Houck	Tom	New Jersey Department of Transportation
Jacob	Heike	DVRPC
Jalayer	Mohammad	Rowan University

Jehanian	Karen	KMJ Consulting, Inc.
Johanson	Erik	SEPTA
Kanthor	David	City of Philadelphia
Kastrenakes	Cheryl	Greater Mercer TMA
Kim	Ellis	Sam Schwartz Consulting
King	Chris	DVRPC
Kingsland	Debbie	Sam Schwartz Consulting
Krykewycz	Greg	DVRPC
Lamond	Mike	Advisory Innovation Group
Lawrence	Katrina	McCormick Taylor
Lawson	Matthew	County of Mercer, NJ
Leiss	Todd	PA Turnpike Commission Traffic Operations
Lewis	Katrina	African - American Chamber of Commerce of PA, NJ & DE
Liu	Meijun	DVRPC
MacKavanagh	Kelvin	DVRPC Goods Movement Task Force
Mailler	Kiersten	Delaware County Planning Department
Malik	Akshay	Office of Transportation, Infrastructure and Sustainability
Malone	Mary	Comcast NBCU
Mammes	Nicola	Philadelphia Office of Emergency Management
Mastaglio	Betsy	DVRPC
Merritt	Darrell	PennDOT District 6-0
Milanese	Joseph	Sam Schwartz Consulting
Murphy	Kevin	DVRPC
Murphy	Sean	University of Delaware
Nardone, PE	Anita	GVF TMA
Neff	Justin	DVRPC
Noble	Tracy	AAA Mid-Atlantic
Ormerod	Lauren	Sam Schwartz Consulting
Ott	Patricia	MBO Engineering, LLC
Panico	Frank	DCTMA
Pease	Orla	AECOM
Proska	Bryan	Traffic Planning and Design, Inc.
Regosch	Christian	Bucks County Planning Commission
Riddle	Ann	DVRPC
Ross	Andrew	Franklin Bridge North
Ryerson, PhD	Megan	University of Pennsylvania
Safara	Samantha	HDR
Sauer	Carrie	Center for Safe Mobility
Schwartz, PE	Sam	Sam Schwartz Consulting
Seaman	Tanya	SOSNA Vision Zero Committee
Spangler	Jerry	Pennsylvania District Attorneys Association
Strassberger	Heather	Philadelphia City Planning Commission
Strigle	Alyson	DCTMA
Strumpffer	Warren	CamCo HTSTF
Svekla	Andrew	DVRPC
Thomas	Keni	Thomcat23

Turner	Elise	DVRPC
Urkowitz	Ronda	Cross County Connection TMA
Valletta	Rachel	Franklin Institute
Viscardi	Mike	NJ TRANSIT
Vuchic	Vukan	University of Pennsylvania
Ward	John	DVRPC
Wong	Steven	Sam Schwartz Consulting
Wray	Steve	Econsult Solutions, Inc.
Yemen	Kelley	City of Philadelphia
Zelenkauskaite	Asta	Drexel University
Zuwiala-Rogers	Nicholas	Clean Air Council
Comer	Bill	
Lobron	Rich	Penn State/Temple
Sternberg	Jackson	PennDOT
Beans	Bill	MBO Engineering, LLC
Diamond	Jim	Philadelphia Police Department
Jordan	Trae	PIDC
Evans	Todd	Mt. Laurel Fire Dept.
Pezzotta	Paolo	ITP, Inc.
Ebeling	Mary	Drexel University
L'Amoreaux	Jeff	Mercer County