

Autonomous Vehicles: What Communities Need to be Thinking About Now

OHIO TRANSPORTATION ENGINEERING CONFERENCE
Columbus, Ohio

October 29, 2019

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MKSK

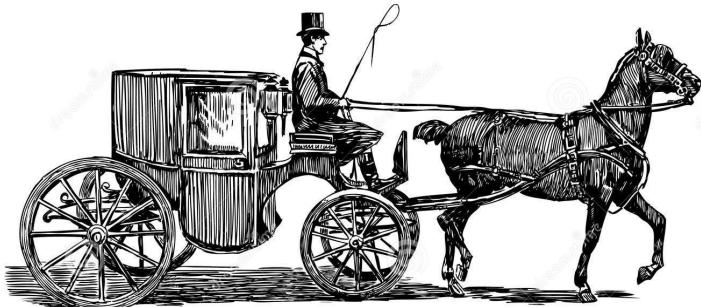
THE PROMISE OF AV/CV

Automated/Connected Vehicles Can Improve Our Quality of Life

1. Autonomous vehicles can **greatly improve safety (Vision Zero)**
– both for occupants as well as pedestrians, bicyclists, etc.
2. AV can **greatly expand autonomy & mobility** for the elderly, handicapped, children, & those who can't afford a vehicle.
3. AV/CV can **increase our existing road capacity** and infrastructure efficiency.
4. AV can improve supply chains and **lower delivery costs**.
5. AV can **greatly improve air quality** w/electric motors.
6. AV could **reduce the need to own a car** and provide options for those without a car.
7. AV/CV could **reduce the need for parking** at each use/site.

TRANSFORMATIVE EVENTS

Transportation Transformations...



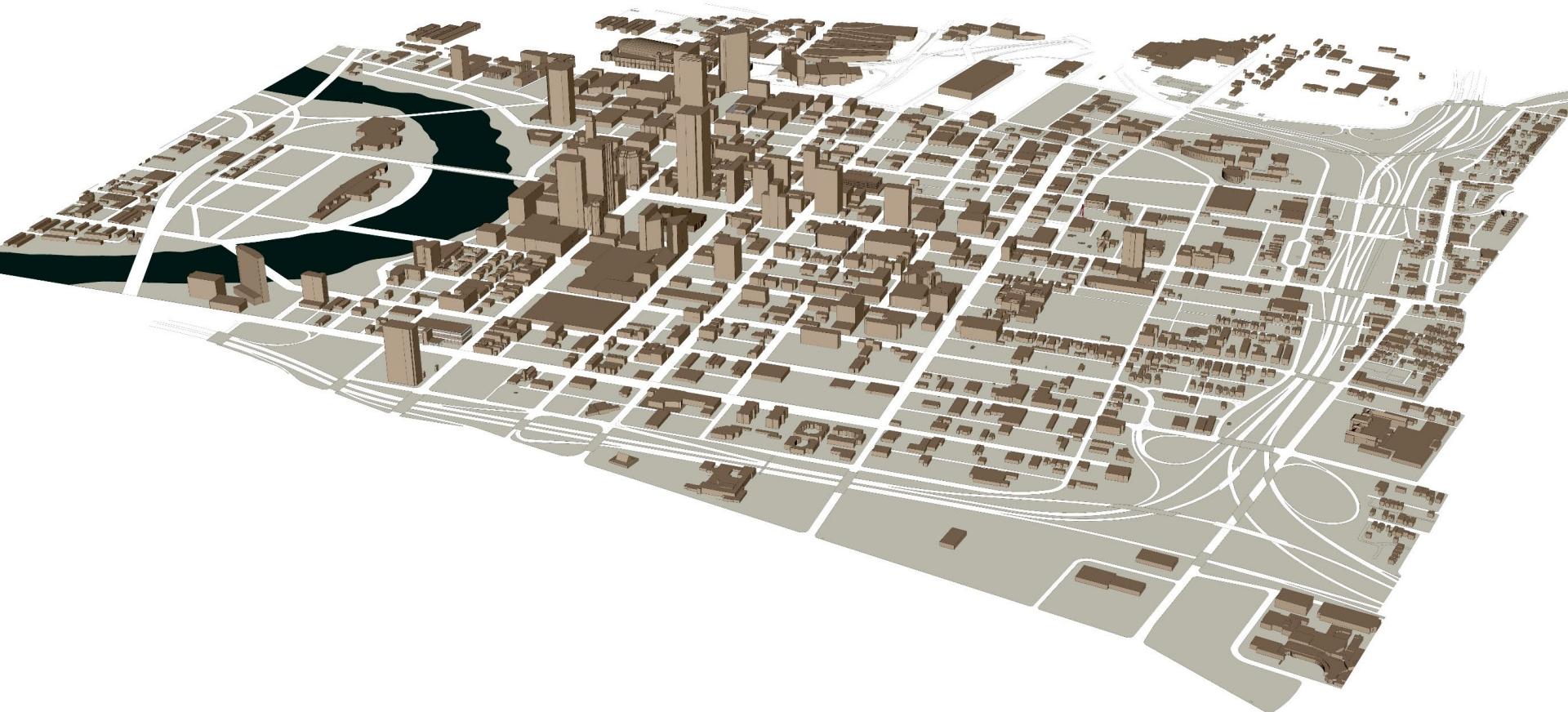
BUT... UNINTENDED CONSEQUENCES

Downtown Columbus in 1921



BUT... UNINTENDED CONSEQUENCES

Downtown Columbus in 2001



UNINTENDED IMPACTS

What we didn't fully understand...

1. Accelerated travel speeds led to vast **acceleration of sprawl**.
2. Vehicle affordability meant great **majority had their own car**.
3. So many individual cars required substantial **expansion of road network**.
4. So many cars necessitated **creation of off-street storage**.
5. Street, site, & building **design changed to emphasize cars** over all else – the built environment substantially changed.
6. Single-occupancy vehicle trips **supplanted transit**.
7. The rise of door-to-door/drive-thru convenience led to a **reduction in willingness to walk**.
8. People without access to a car were **left behind**.

PLAN NOW FOR AV/CV

“My whole career, people have been saying: We wish we could have known the social costs of driving, we would have done this differently,” says Samaras of CMU in Pittsburgh, where self-driving Uber cars hit the streets earlier this year. **“Policymakers have to think about this now, because the decisions they make affect the landscape for a century.”**

Costa Samaras, assistant professor and civil engineer at Carnegie Mellon University in Pittsburgh

AV ADOPTION – 2015 PREDICTIONS

How Fast Will AV Be Adopted?

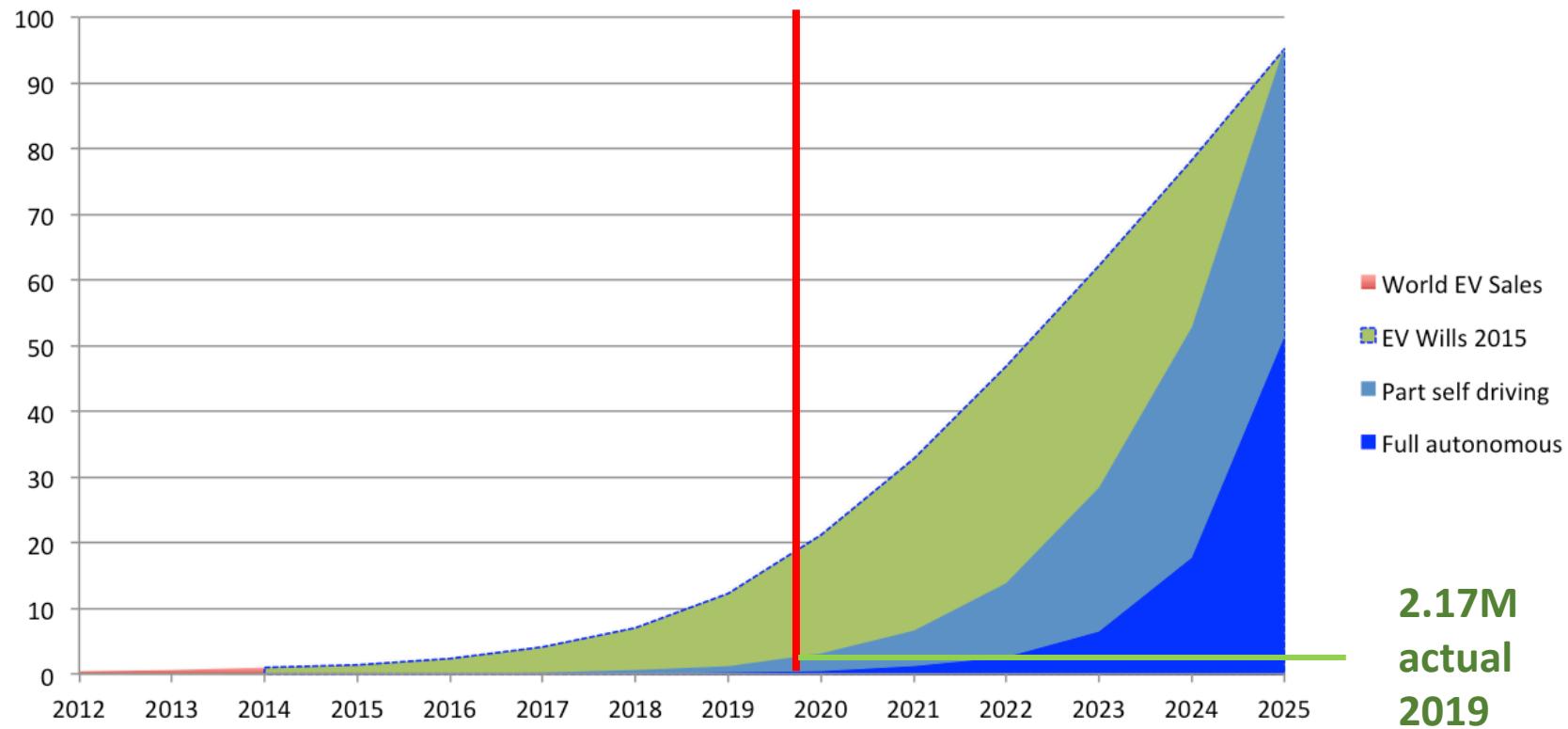
Prediction from 2015

**Global EV predicted cumulative sales (millions) to 2025
including self-driving and fully autonomous**

EV sales data 2012-2014 @InsideEVs

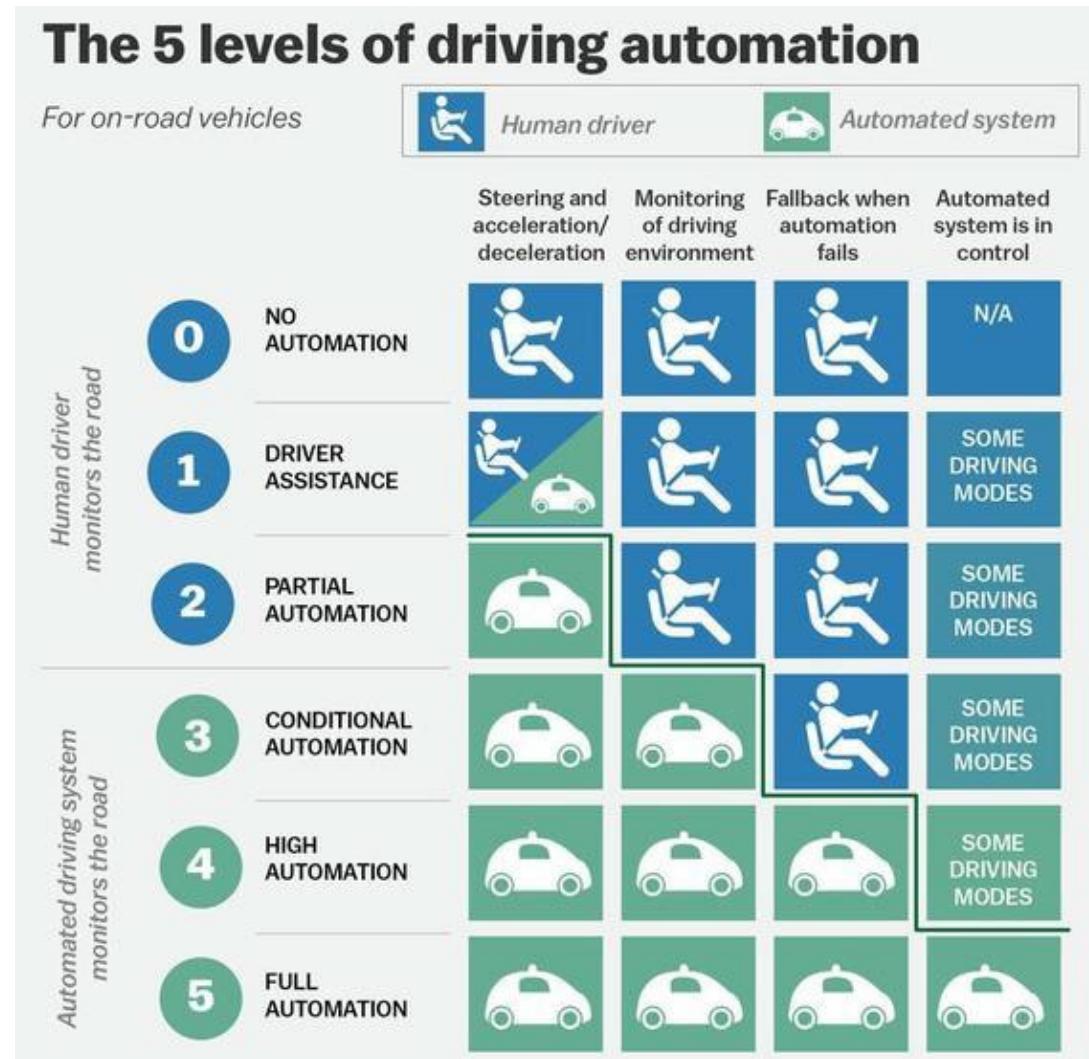
@ProfRayWills forecast

<http://www.raywills.net/rtwtechadopt.html>



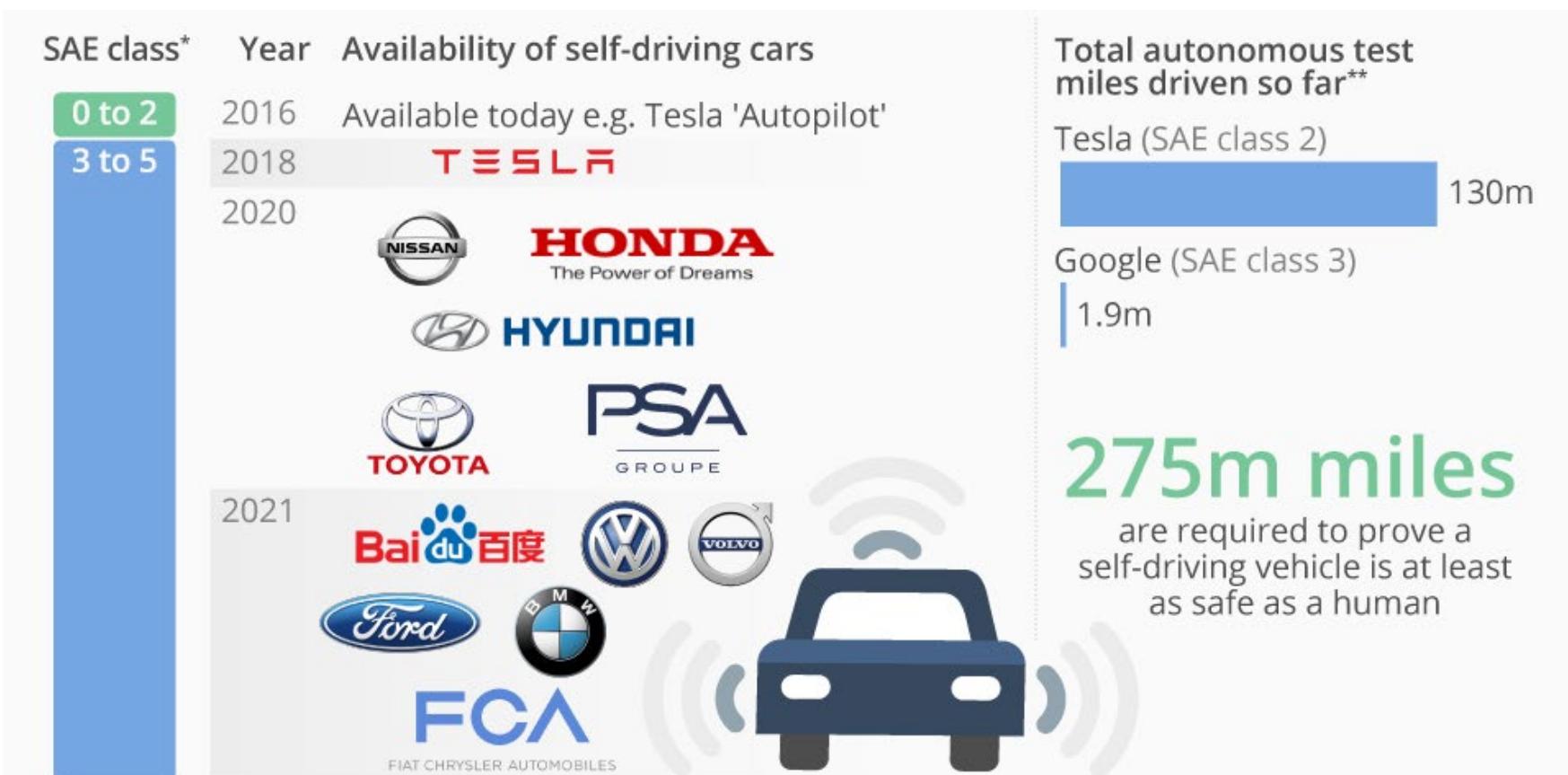
AV PRIMER

5 Levels of Vehicle Automation (per US NHTSA)



AV ADOPTION – 2016 PREDICTIONS

How Fast Will AV Be Adopted?



Total autonomous test miles driven so far**

Tesla (SAE class 2)

130m

Google (SAE class 3)

1.9m

275m miles

are required to prove a self-driving vehicle is at least as safe as a human

* Levels 1 und 2 are assistance systems only. From level 3, the vehicle constantly monitors traffic.
From level 4, driver intervention is not required even in an emergency

** To June (Tesla)/August 2016 (Google)

Sources: LSP Digital research, manufacturer information, SAE, RAND



@StatistaCharts

statista 

AV ADOPTION – 2019 PREDICTIONS

How Fast Will AV Be Adopted?



Partnership for
Transportation Innovation
& Opportunity™

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**UBER CEO: FULL
DRIVERLESS IS MORE
THAN 15 YEARS
AWAY**

JUNE 11, 2019



Uber CEO Dara Khosrowshahi said that he doesn't expect Uber's ride-hailing service to be fully driverless for at least 15 years.

"No drivers? I think it will be 15-plus years," he said in an interview at the Economic Club of Washington. "I think it'll take a long time." June 11, 2019

AV ADOPTION – JULY 2019

How Fast Will AV Be Adopted?

The New York Times

Despite High Hopes, Self-Driving Cars Are ‘Way in the Future’

Ford and other companies say the industry overestimated the arrival of autonomous vehicles, which still struggle to anticipate what other drivers and pedestrians will do.

“We overestimated the arrival of autonomous vehicles.”
- Ford Motor Company CEO
Jim Hackett, April 2019

“The industry’s bigger promise of creating driverless cars that could go anywhere was ‘way in the future’ according to Argo’s chief executive, Bryan Salesky.”

Source: The New York Times, “For Self-Driving Cars, No Green Light Soon”, July 21, 2019

AV ADOPTION

Some Issues Slowing AV Advancement & Adoption

- 1. Crashes and fatalities involving self-driving vehicles** - ex. Uber crash with pedestrian in Tempe, Ariz & three Tesla drivers while in “autopilot” mode.
- 2. Companies were very optimistic...** “Companies thought this was a very straightforward problem. You just throw in some sensors and artificial intelligence, and it would be easy to do.” Sam Abuelsamid, an analyst at Navigant Research.
- 3. Modeling & predicting human behavior is difficult** - developing software that can reliably anticipate what other drivers, pedestrians and cyclists are going to do, will be much more difficult.



CURRENT THINKING

Focus on Testing and Improving Technology

- Lower speeds
- Fixed Routes – known & less conflicts
- Requires operator



This is a good thing –
it allows us to plan and get in front of the technology.

WHAT SHOULD WE BE DOING NOW?

Focus on the Policies – What do we want from this technology?

1. Emphasize **communities and people first**. We should benefit.
2. **Improve safety**. We need to ensure the safety of occupants, pedestrians, bicyclists, etc. Help us toward Vision Zero.
3. Expand access and **mobility for all**. Work on policies, programs, systems, and routes that provide greater mobility for the entire community.
4. Do not harm our **complete streets**. Do not sacrifice the pedestrian and bicycle environment or walkability to accommodate AV/CV.
5. Pay close attention to **curb management, parking impacts**, and access, drop-off/pick-up systems.
6. Do not let **transit systems** be compromised by AV/CV. Keep investing in transit and make them part of the solution.
7. Minimize **zombie car AVs**.

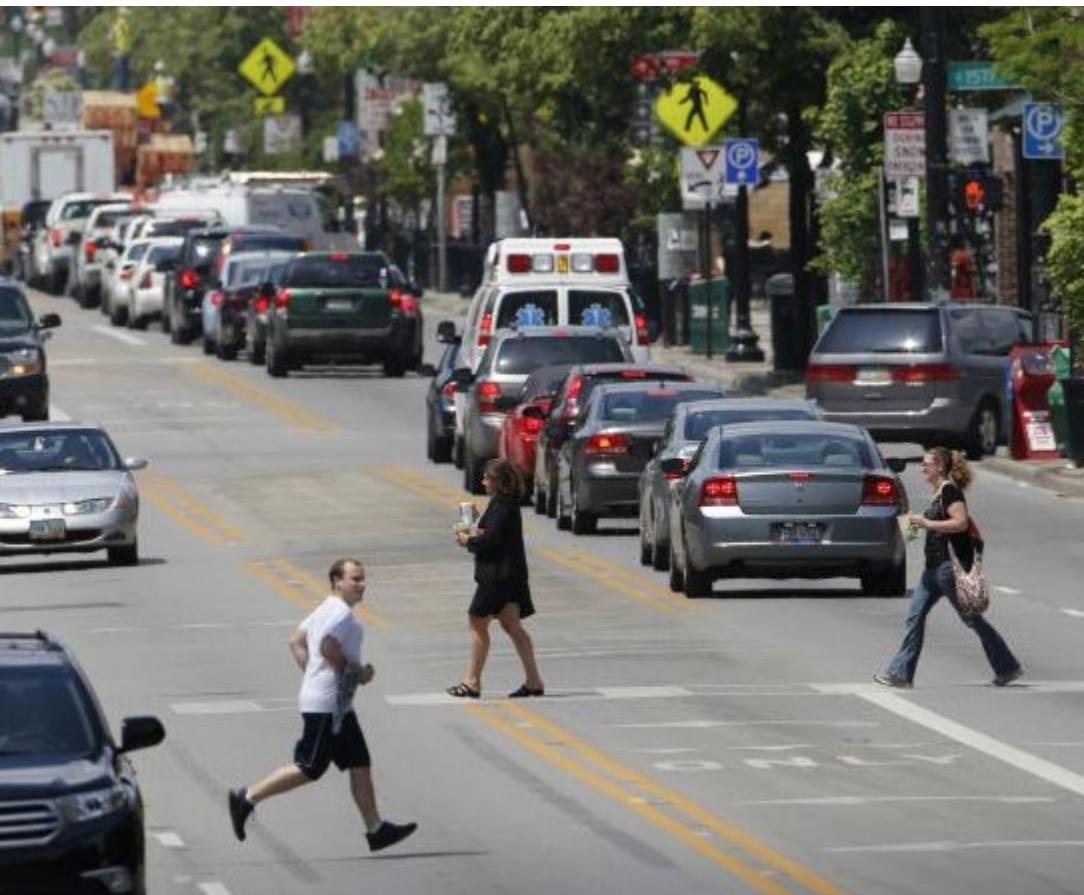
KEEP BUILDING COMPLETE STREETS

All modes must still be accommodated



UNINTENDED CONSEQUENCES

Pedestrians Intentionally Jumping In Front of AVs



Photos: Columbus Dispatch

UNINTENDED CONSEQUENCES

If Pedestrians Intentionally Jump In Front of AVs,
What Will Our Design Response Be?

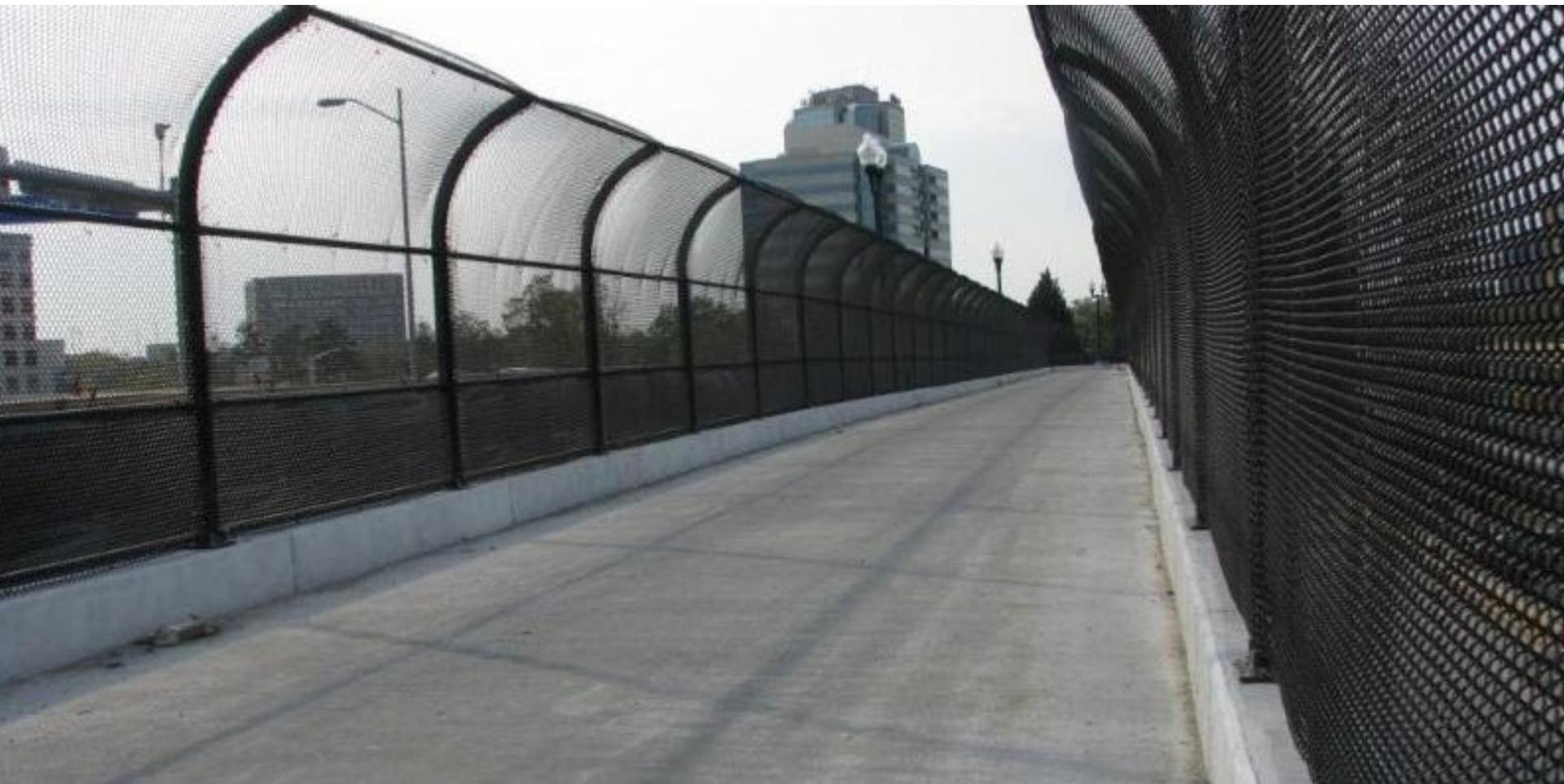


Photo: Mary Barton

UNINTENDED CONSEQUENCES

If Pedestrians Intentionally Jump In Front of AVs,
What Will Our Design Response Be?



FOCUS ON CURBSIDE MNGMNT.

Drop-off & Pick-up and Parking (Curb-side Management) must be addressed with AVs

Figure 2.19 - AVs' Transformation of a City Block: Surface parking lots, traffic lights, and on-street parking, while common today, may disappear in an AV world. In their place we may find drop off lanes, pedestrian and bicycle amenities, in-fill development, and safer, less cluttered intersections.



Florida State University

BEFORE

CURBSIDE MNGMNT / PARKING

Drop-off & Pick-up and Parking (Curb-side Management) must be addressed with AVs



Florida State University

AFTER

CURBSIDE MNGMNT / PARKING

How do we address morning & evening rush hour?

How do we manage waiting areas for AVs?



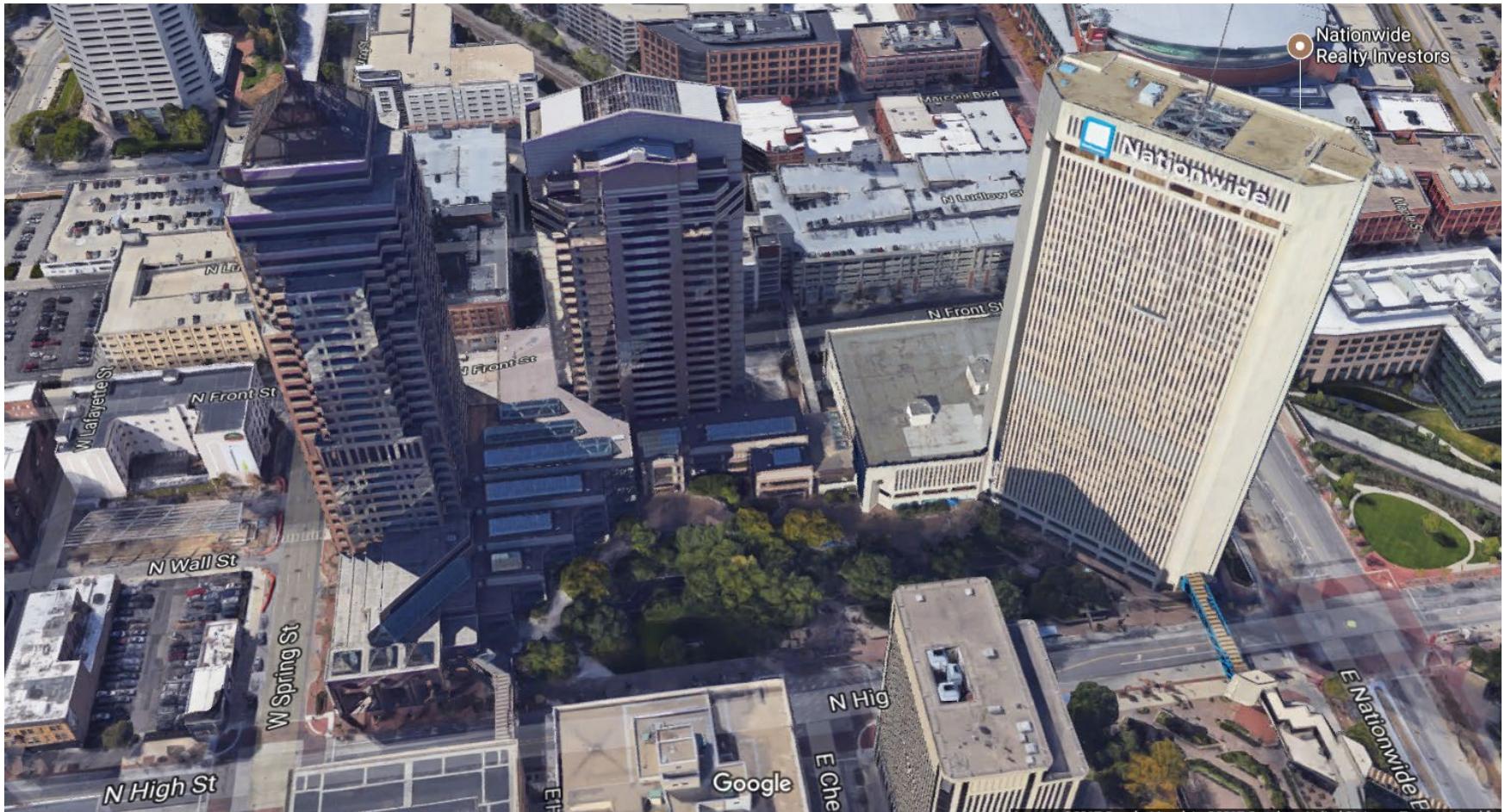
CURBSIDE MNGMNT / PARKING

How do we address streets with no on-street parking?



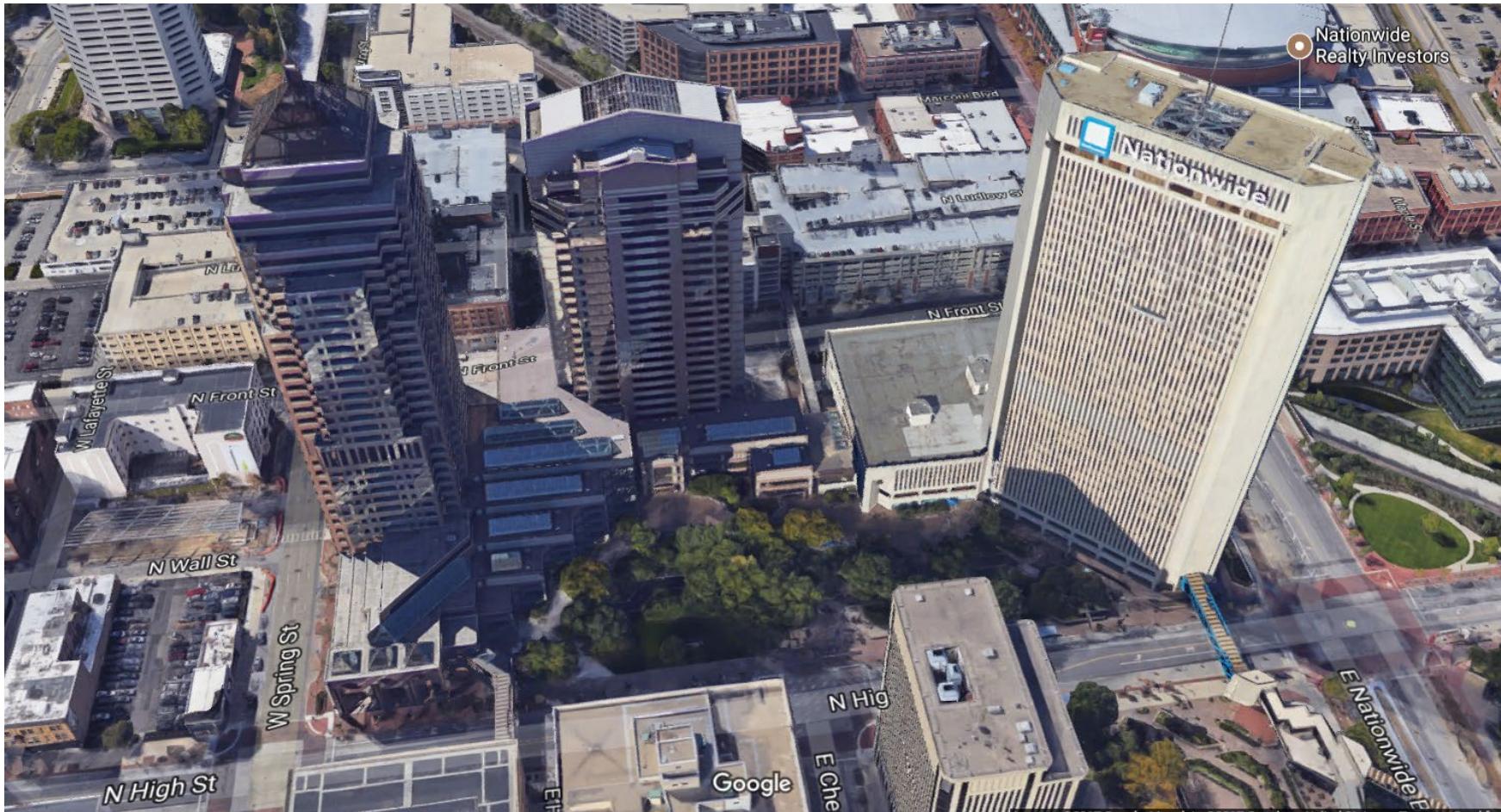
CURBSIDE MNGMNT / PARKING

What if 5,000+ people are working on these blocks?



CURBSIDE MNGMNT / PARKING

What if 5,000+ people are working on these blocks?
What if there is no transit left?



CURBSIDE MNGMNT / PARKING

Impact of Drop-off & Pick-up must be carefully considered

Think of our Airports... this can not be our future streetscape.



CURBSIDE MNMGNT / PARKING

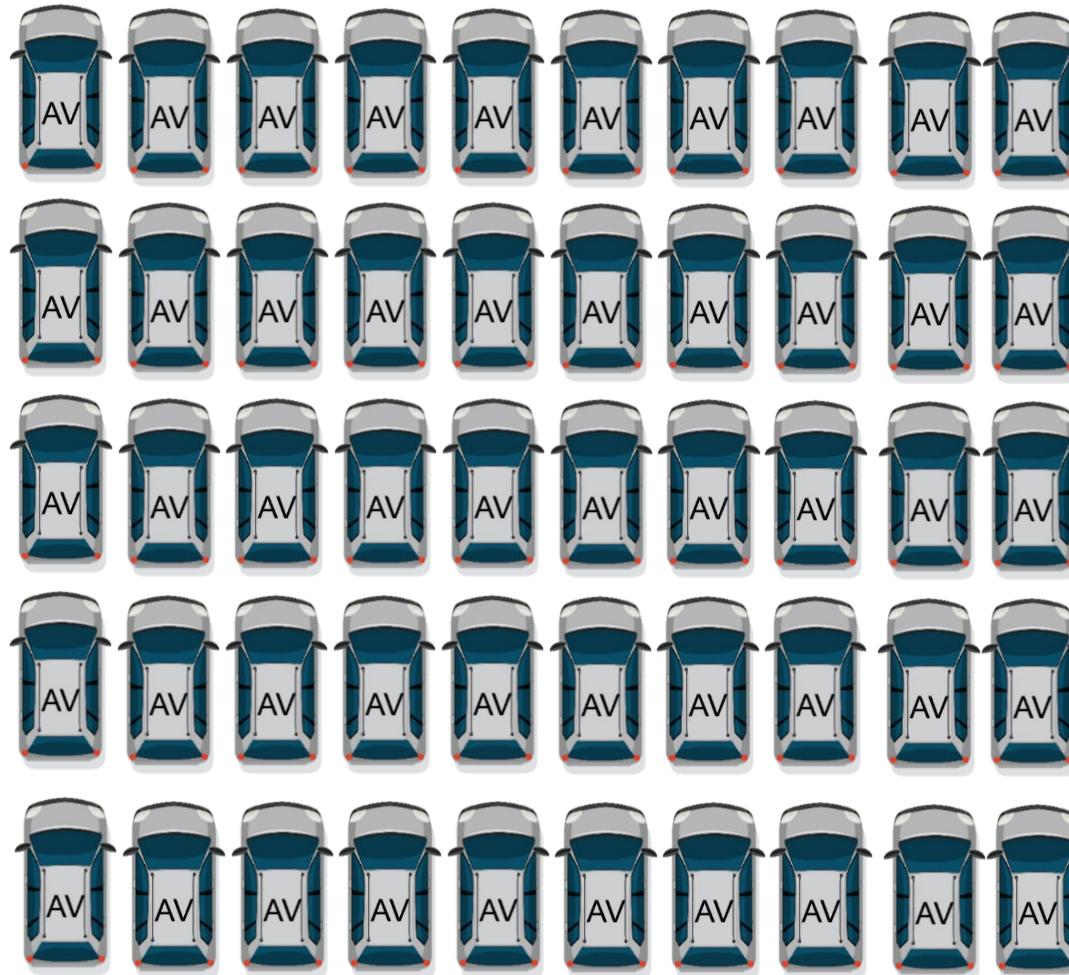
Impact of Drop-off & Pick-up must be carefully considered

Think of our Schools... do parking lots become circulation lots?

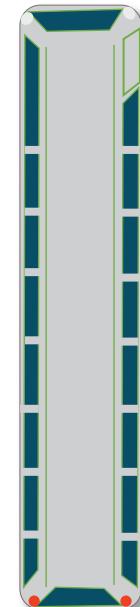


CONTINUE TO INVEST IN TRANSIT

It is still most efficient for our urban environments



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MOBILITY FOR ALL

CITYLAB

DESIGN / TRANSPORTATION / ENVIRONMENT / EQUITY / LIFE



In Columbus, Ohio, too many moms aren't getting to watch their kids grow up. Better mobility might be part of the fix. // Jessica Rinaldi/Reuters

“Technology doesn’t necessarily trickle down to serve those folks who are most in need. You have to put the people you’re going to focus on in the forefront.”

*Jason Reece,
Assistant Professor,
Knowlton School,
The Ohio State University*

Who Wins When a City Gets Smart?

LAURA BLISS NOV 1, 2017

Last year, Columbus, Ohio, won a \$50 million grant for high-tech transportation innovation, with a promise to help its most vulnerable families. Now some worry their needs are fading into the background.

CONCLUSIONS

“Ten Rules for Cities About Automated Vehicles” Jeff Speck, CNU

1. **Be Afraid.** The positives can be offset quickly if we’re not careful.
2. **Be Realistic.** In America, we have shown zero propensity to control how people buy or use their cars.
3. **Decide How Much Traffic You Want.** The right solution is to start by making the streets what you want them to be.
4. **Plan for More Sprawl Pressure.** Smart Growth policy is needed.
5. **Understand Transit Geometry.** AV is not a solution to transit.
6. **Don’t Rob Transit.** Replacing trains & buses with AVs will cripple mobility.
7. **Own the Streets and Own the Data.** AVs as business model are only viable on public streets. Sharing data is small price for companies to pay.
8. **Don't buy any urban vision that forgets urbanism.** The adoption of AVs should not be allowed to replace traditional city form with something different.
9. **Unify around a set of policy demands.** There are a number of ways that cities will need to regulate AVs if they are to be a boon and not a bane.
10. **Invest in the current technological revolution.** How can we provide the most useful mobility to the most people with the most positive outcomes for society? The answer includes cars, but also trains, buses and especially biking & walking.

CONCLUSIONS

Autonomous Vehicles will profoundly effect our cities.

As Transportation Planners & Designers, we must:

1. Realize that, as with any disruptive technology, we do not know or fully understand all of the potential impacts or consequences at this point in time.
2. Continue to monitor and seek understanding of how this technology will influence the form and operation of our communities and impact our populations.
3. Thoughtfully prepare for the varied outcomes and evaluate and adjust our plans and policies as new data and insight is gained.
4. Keep our communities and elected officials informed of the latest research and best practices.

Discussion

