Technology for All

How Equity, Access, and Affordability Must Feature in Next-Generation Vehicle Policy

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The development of advanced automated vehicle safety technologies, including fully self-driving cars, may prove to be the greatest personal transportation revolution since the popularization of the personal automobile nearly a century ago. (*1*)

In 2017, a bipartisan group of U.S. senators conducted a hearing titled "Paving the Way for Self-Driving Vehicles." The themes of the hearing reflect the focus of many current discussions surrounding this new group of technologies, and thus it is as reasonable a place as any from which to begin our discussion. The principles in question are specifically itemized in the hearing press release:

> Prioritize safety.… Promote innovation and reduce regulatory roadblocks.… Remain tech-neutral to avoid favoring one business model over another.… Reinforce the separate regulatory roles of federal and state governments.… Strengthen cybersecurity.… Educate the public as to the differences between conventional and autonomous vehicles. (*2*)

Although each of these principles is perfectly reasonable in itself, the list as a whole has a problematic absence: nowhere is access, affordability, or equity mentioned. With all the excitement generated by the prospect of automated vehicles saving transportation networks, very little thought has been given to the material and societal costs of that shift. How do we come to terms with current inequities and potentially use automated vehicles to build a more connected society in a way that rights those wrongs, rather than compounding them?

Machines themselves may not inherently possess the same biases and blind spots as human beings, but the designers, programmers, and industry executives steering machine algorithms and implementation certainly do. The effects of automated vehicles on the future cost of driving cannot be known, and what conjectures have been made are not necessarily reliable. As Todd Litman has pointed out:

> Most optimistic predictions are made by people with financial interests in the industry, based on experience with other disruptive technologies such as personal computers, digital cameras, and smart phones. Vehicles

typically last an order of magnitude longer, cost two orders of magnitude more, impose greater external costs, and rely more on public infrastructure than other technologies. (*3*)

Thanks to all of the factors that Litman identifies, innovations in transportation take time to play out and are affected more by local, state, and federal regulations than are many other types of technology. In the near future, automated vehicles certainly will be more costly than traditional cars because of the current high costs of necessary onboard GPS; central computers; lidar systems; and ultrasonic, odometry, and radar sensors (*4*).

Given the edifice of regulations that must be constructed and the likely financial barriers to access, urban planners must now begin the work to consider the potential effects of automated, connected, and next-generation vehicles on those who do not have the financial resources to participate in the first wave of implementation—and to plan for the biases and blind spots of the public servants and private business-people who will steer that implementation.

Echoes of History

TRANSPORTATION POLICY AND STRUCTURAL INEQUALITY

Going all the way back to the advent of the horseless carriage, policy discussions around the management strategies for and potential benefits of new transportation

Urban planners must consider the effects of connection and automation on low-income communities.

technologies have, at the local, state, and national levels, consistently neglected to consider the uneven effects of these new technologies on many underserved and underrepresented populations. Although the negative impacts of the advent of the automobile on vulnerable populations in the United States are not a frequent topic in transportation industry publications, they have been studied by anthropologists. For example, in her paper "The U.S. Car Colossus and the Production of Inequality," Catherine Lutz cites many ethnographic studies of the ways in which, for the nation's poor, "the fundamental right to mobility" has been repeatedly compromised (*5*).

Transportation planners tend to view a lack of access to mobility options, especially personal vehicles, as a marker of the plight of the underserved and underrepresented—but Lutz's article points to the ways in which the advent of the automobile actually helped to create much of the inequity in this country. U.S. cities and rural areas alike were built assuming car ownership as a default status for American adults. This creates fundamental barriers to employment and educational access for those without the means to own a personal vehicle.[1] As Stuart Cohen observes:

For more than half a century our transportation system has largely focused on moving cars, in part to support increasingly sprawling land uses. Over-reliance on vehicles has come at a high expense to personal budgets, public health, and the environment. Very low-income families spend, on average, over 30% of their income on transportation. For those without a private vehicle, limited access to jobs, education, health care, and other opportunities is a barrier to self-sufficiency. (*6*)

Poorer households spend a higher percentage of their income on transportation not simply because their income is lower, but because their transportation costs often are actually higher. They often have to travel further from their homes for work and school, which is exacerbated by the fact that "about 70% of regional jobs,

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[1] Not to mention medical access, access to healthy and fresh foods, and more.

Photo: Jaguar Mena, Flickr

The development of automated technology offers new opportunities for industries and communities—but access, affordability, and equity must be addressed.

For the purposes of this article, underrepresented people include women; poor communities; mobility-challenged people, including people with disabilities, seniors, and youth; and other historically disadvantaged communities, including people of color, immigrant communities (including those with language barriers), and rural communities. None of these identities occur in isolation. Many overlap, and this intersectionality must be kept in mind when discussing policies that affect underrepresented groups.

Left: From the earliest days of modern highways—and even before—policy conversations about transportation technologies have neglected vulnerable populations and, often, have caused or exacerbated inequitable outcomes. Right: U.S. rural areas—as well as many cities—were planned and constructed under the assumption of car ownership, creating opportunity barriers to those unable to own a car.

retail, and other opportunities are now outside of downtown centers" (*7*). Public transportation networks traditionally have been built to carry riders from the suburbs to the downtown core, so those who live in one suburban area often cannot rely on public transportation to reach a job opportunity in another suburban area—even if it is nearby.[2]

On top of this, poorer households often have access to fewer functional alternatives to traditional public transportation, and their transportation costs could continue to rise as new technologies replace traditional publicly funded, publicly available transportation options.

EQUITY EFFECTS OF INNOVATION

The foundational decisions that created the above situation were made as the United States was developing its modern highway system. The equity-related effects of more recent innovations also can be considered—for example, the effects of the rise of private transportation network companies (TNCs) such as Uber and Lyft. From the local to the national level, the rise of these services has not been accompanied by a fast response from officials to create policies regulating the operation of

TNCs. It has been difficult, therefore, to ensure that they are providing a genuine benefit to all communities.

According to the *Atlantic* article "Uber and Lyft Are Failing Black Riders," the same biases and bigotry that plagued the for-hire vehicle industry for decades have spilled over into the next generation of transportation options (*8–9*). Even more troubling is widespread decisions by transit agencies, private companies, and real-estate developers to use Uber, Lyft, and similar options to address first- and last-mile service gaps, rather than investing in or advocating for better transit. As more public- and private-sector decision

makers explore the possibility of using TNCs to replace the connections traditionally made by public transit, underserved and underrepresented communities may feel disproportionate effects.[3]

Underrepresented people thus far have faced similar barriers to using shared modes like carpooling and ridesharing. Although tech-driven carpooling and ridesharing can potentially supplement or enhance public

[3] The transportation industry is just beginning to collect data on this topic. My own organization, 128 Business Council, began collecting data this past year on TNC usage patterns of the populations we serve.

[2] This scenario is particularly relevant since, according to a recent Pew report, "about half of the U.S. poor population (49%) lives in suburban and small metro counties, while 34% live in cities and 17% in rural areas." See Parker, K., J. Menasce Horowitz, A. Brown, R. Fry, D. Cohn, and R. Igielnik. *What Unites and Divides Urban, Suburban and Rural Communities.* Pew Research Center, Washington, D.C., May 2018.

Residents of Atlanta, Georgia, wait for a bus. In 1974, MARTA reduced fares, increased routes, and added nightly service and parking in underserved communities—and ridership drastically increased.

transit options for some communities, "disadvantaged communities face barriers to using shared mobility including financial, technological, and language and cultural barriers.... Since many new technologies rely on scaling up the number of users in a given area, this may mean services, such as carpooling and car-sharing, are simply unavailable" (10).[4–5]

In many communities, transportation options beyond a privately owned vehicle are already scarce; when the focus is on the replacement of already-limited public transit options, this contributes to further segmentation of an already-segmented population. Private industry has no systematic incentive to do the right thing. Their focus usually is the bottom line; therefore, it is the role of policy makers to consider access, affordability, and equity.

If these histories and the present reality are taken seriously, it brings up the following questions: what will happen when society embraces the new frontier of automated vehicles? Will it learn from these histories—or repeat them?

Not a Neutral Streetscape

Much of the nation's transportation infrastructure lags behind current technological standards across modes—to say nothing of being prepared for new technological advancements—and this deficit especially isolates underserved and underrepresented people. Communities are not demographically integrated, and the usability and connectivity of existing roadways—the ones onto which automated vehicles would be introduced—are, on the whole, worse in those communities belonging to underrepresented groups.

When the shameful history of redlining and other barriers erected to segre-

gate minority groups is considered, the history of road construction begins to look like a history of those with means to live in the "right" communities becoming increasingly connected to the "right" jobs and schools—to the exclusion of other communities (see box, below). One study by the Brookings Institution concluded that, although post–Civil Rights Era measures slowed and in some cases began to reverse the process of racial segregation, progress toward structural equality across communities (or toward the economic integration of those communities) in the current millennium has been underwhelming.[6] If current transportation infrastructure inequities are not addressed, how can the same segregative mistakes be avoided in the implementation of new technologies?

WHAT MACHINES MISS

Decision-making power—and even decision-making consideration—also is unevenly distributed across communities. As a result, even seemingly value-neutral differences in how transportation infrastructure has been constructed, operated, and used take on major equity-related implications. Ostensibly minor questions can be loaded: for example, how should an automated vehicle understand a pedestrian detected waving at an intersection?
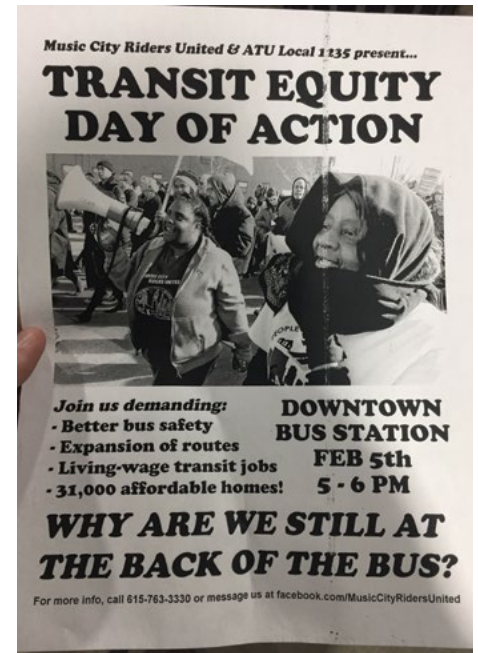

Photo: Stephen Yeargin, Flickr

A 2019 Music City Riders United protest in Nashville, Tennessee, drew attention to the need to expand bus service to historically black communities.

Much of how people interact with each other in the streets is determined by a "complex and culturally guided series of interactions, including facial expressions (e.g., smiles, raised eyebrows, etc.), and gestures (e.g., a horizontal wave meaning 'go ahead' or a vertical wave meaning 'thanks')" (11). These expressions and gestures vary not only from region to region but even from neighborhood to neighborhood. Variations in right-of-way practices from community to community present a similar set of challenges when it comes to determining which communities' practices are taken as standard.

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[4] Physical barriers, which fall outside the scope of White's discussion, also should be mentioned here. Shared mobility options generally are unavailable to those who rely on wheelchairs—or, for that matter, strollers—and pose a special challenge to potential users with certain disabilities (8).

[5] "Scaling up the number of users in a given area" means that shared mobility providers are hesitant to enter areas in which there is not an established market for their services.

[6] See Frey, W. White neighborhoods get modestly more diverse, new census data show. *The Avenue*, Brookings Institution, Dec. 13, 2016. This article focuses on neighborhood demographics, not transportation issues, but the point is that transportation policy decisions that led to neighborhood segregation in the past have not been overcome in the present.

As defined by the Federal Reserve's Consumer Compliance Handbook, redlining is "the practice of denying a creditworthy applicant a loan for housing in a certain neighborhood even though the applicant may otherwise be eligible for the loan. The term refers to the presumed practice of mortgage lenders of drawing red lines around portions of a map to indicate areas or neighborhoods in which they do not want to make loans." For more, see www.federalreserve.gov/boarddocs/supmanual/cch/fair_lend_fhact.pdf.

Photo: Adrian Cabrero

ECONOMIC DISRUPTION

New transportation technologies threaten to fundamentally disrupt the preexisting economic networks that use the current streetscape—especially for those who make their living operating the vehicles that transport goods and people. In the past, driving a truck or operating a train was a dependable career open to those without advanced education. Today, these employees already are struggling to afford to live in the urban centers where they primarily work. The prospect of automated technology rendering these positions unnecessary will erase entire employment sectors (*12*). What new jobs will be available to these employees?[7]

An objection might here be raised that the Federal Transit Administration does require any new transportation project receiving federal funds to conduct an equity analysis to determine any negative impact "related to race, color, or national origin" on communities (*13*). These analyses do not take into account the institutional and historical policies that created inequity, however, nor do they require any consideration of the intersectionality of identities. How can policy makers build better projects for the communities they are meant to serve when even the policies meant to protect the communities do not engage the level of complexity required to avoid marginalizing those groups further?

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[7] There actually is a severe labor shortage in the trucking industry already, in part because people know that automation is on the horizon. A full discussion of labor implications, and the partially voluntary shift that may already be under way, is outside the scope of this article.

New policies for automated, connected, and next-generation vehicles cannot merely address these new technologies in isolation but also must address the shortcomings of the current transportation infrastructure and the planning that has created it. The advent of the automobile, the construction of the U.S. highway system and of legacy transit systems, and the process of segregation have combined to limit transportation access for underrepresented populations. Because this defines the status quo, without intentional action the advent of automated vehicles will only extend this inequity into the future.

Better This Time

Urban planners and policy makers alike have incredibly high hopes for the possibilities presented by automated vehicles (AVs). Brian Jencek and Jerome Unterreiner express some of these possibilities:

> The arrival of self-driving cars brings opportunities to do much more than simply compress the size of streets, tweak curb heights, and regain a few feet of sidewalk space on each side. The 4.12 million miles (6.63 million km) of roadways in the United States, some of which pass through the country's highest-value urban real estate, serve as an unparalleled land bank. As AVs leverage the 'internet of things' to connect with the surrounding infrastructure, municipalities will be able to create truly universal streets. (*14*)

As an urban planner, I welcome the opportunity to rethink how public spaces are used, but many questions remain: where will we start? Will we look at downtown corridors, new development, or redevelopments? Where will our underserved and underrepresented neighborhoods fall in this list? What will happen to these neighborhoods as the prices of homes and land increase? And, ultimately, how will we respond to all of these questions better than we have done in the past?

Meeting this challenge must begin with engagement. Underserved and

Photo: manolofranco, Pixabay

In many cities, drivers of freight, public transit, or ride-hailing services and taxis cannot afford to live where they work.

Photo: Cade Martin, Centers for Disease Control and Prevention

To help ensure equity in transportation policy, transportation leaders and policy makers must increase community engagement.

underrepresented communities historically have not had a strong voice in the planning process. The reasons for this often are incredibly simple: those most in need of more transportation options often have the least opportunity to respond to invitations for engagement.

For example, most public meetings are held in the evening, which makes attendance difficult for those without traditional 9-to-5 jobs, as well as those without easy evening availability, like single parents. The locations of these meetings also may be hard to reach. It is vital, therefore, for policy makers of all stripes to meet the communities we serve within those communities themselves, rather than expecting the public to come to us—and to put in the time to actually build a history of collaborative, two-way communication. The conversation must begin before drawing up plans and should not be merely the final stage in that plan's confirmation.

Community engagement is where we must begin, not where we end.

I like the idea of automated, connected, and next-generation vehicles, but I would like them a lot more if I knew that all of us—not just those with means—will have access to the technology. I would like to know that we have a plan in place for addressing current transportation infrastructure failings. And I have to know that we are not going to continue to make the same mistakes that have led to the transportation access inequity from which communities already suffer. If we do not address these fundamental issues, the technology might not fail—but our communities absolutely will.

The views and opinions expressed in this article are those of the author and do not necessarily reflect the official policy or positions of the Massachusetts Department of Transportation of the Massachusetts Bay Transportation Authority.

REFERENCES

1. National Highway Traffic Safety Administration, U.S. Department of Transportation. Federal Automated Vehicles Policy: Accelerating the Next Revolution in Roadway Safety. Sept. 2016, p. 5. www.transportation.gov/AV/federal-automated-vehicles-policy-september-2016.
2. U.S. Senate Committee on Commerce, Science, and Transportation. "Senators Release Bipartisan Principles for Self-Driving Vehicles Legislation." Jun. 13, 2017. https://www.commerce.senate.gov/public/index.cfm/2017/6/enators-release-bipartisan-principles-for-self-driving-vehicles-legislation.
3. Litman, T. *Autonomous Vehicle Implementation Predictions: Implications for Transport Planning.* Victoria Transport Policy Institute, British Columbia, Canada, Nov. 26, 2018, p. 3.
4. Crute, J., W. Riggs, T. Chapin, and L. Stevens. *PAS Report 592: Planning for Autonomous Mobility.* American Planning Association, Chicago, Ill., Sep. 2018, pp. 15, 37.
5. Lutz., C. The U.S. Car Colossus and the Production of Inequality. *American Ethnologist,* Vol. 41, No. 2, 2014, p. 232.
6. Cohen, S., and S. Shirazi. Can We Advance Social Equity with Shared, Autonomous and Electric Vehicles? Presented at Three Revolutions: Sharing, Electrification, Automation, Davis, Calif., Feb. 2017, p. 1. www.transformca.org/sites/default/files/3R.Equity.Indesign.Final_.pdf.
7. Cohen and Shirazi, p. 3.
8. White, G. Uber and Lyft Are Failing Black Riders. *Atlantic,* Oct. 31, 2016. www.theatlantic.com/business/archive/2016/10/uber-lyft-and-the-false-promise-of-fair-rides/506000.
9. Ge, Y., C. Knittel, D. MacKenzie, and S. Zoepf. *Racial and Gender Discrimination in Transportation Network Companies.* Working Paper 22776. National Bureau of Economic Research, Oct. 2016.
10. Cohen and Shirazi, p. 4.
11. Sandt, L., and J. Owens. Discussion Guide for Automated and Connected Vehicles, Pedestrians, and Bicyclists. Pedestrian and Bicycle Information Center, Chapel Hill, N.C., Aug. 2017, p. 9.
12. *Taming the Autonomous Vehicle: A Primer for Cities.* Bloomberg Philanthropies and the Aspen Institute Center for Urban Innovation, New York, March 2017, pp. 68–69.
13. *Title VI Requirements and Guidelines for Federal Transit Administration Recipients.* Title VI Circular 4702.1B. Federal Transit Administration, Oct. 1, 2012.
14. Jencek, B., and J. Unterreiner. People-Driven Design: Planning for the Urban Future of Autonomous Vehicles. *Urban Land Magazine,* May 24, 2018.