The Future of Transport Is Sustainable Shared Mobility

By Jacob Mason, ITDP

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It has been clear for decades that compact, mixed-use cities centered on walking, cycling, and public transit provide the greatest, most equitable access for everyone, and at greatly reduced cost to society.[1] Technologies like on-demand e-hail services have already had a huge impact on our travel patterns, and others, such as automated vehicles (AVs), may have even larger consequences, both good and bad. Robin Chase, founder of Zipcar, has best exemplified this situation with her often-cited "Heaven or Hell" scenario. "Heaven" is a future where automated vehicles are completely shared, reducing congestion and improving streets and accessibility for everyone, while "Hell" is more privately owned vehicles clogging the streets, even more car-oriented land use, and increased sprawl. Similarly, technology is a tool, and depending on how that tool is used, it can be helpful or harmful.

Let's start with "hell." Poor implementation of new technology could lead to dramatically less efficient and sustainable transportation. Vehicle automation and electrification significantly reduces the cost of travel. Electricity is cheaper than gas, and electric vehicles (EVs) have many fewer parts, making them much cheaper to maintain. Without the need for a driver, automated vehicles are cheaper to operate, both in terms of the economic cost of a driver and the opportunity cost of driving itself (as opposed to working, sleeping, etc.). When you make something cheaper, though, people use more of it. When applied to solo car travel, this could be disastrous, increasing the amount of solo vehicle travel (at the expense of other modes), increasing congestion, and reducing mobility. Zero-occupancy vehicles could circle the city making deliveries and waiting for pickups, further increasing vehicle kilometers.

The "heaven" scenario is what ITDP calls Sustainable Shared Mobility, and it requires the effective implementation of new technologies and making full use of the benefits

AVs and EVs by focusing on supporting walking, cycling, and public transport. In this scenario, cost reductions are applied to public transport and other higher-occupancy vehicles and not to solo driving and other low-occupancy modes. Lower costs on high-capacity modes leads to a combination of lower fares and better service, which in turn attracts more people to use them. With more people on these more space-efficient modes of transportation, everyone is able to get where they are going quicker, and the transportation system becomes much more equitable.

Sustainable Shared Mobility is achieved in two ways; by discouraging inefficient (low-occupancy vehicle) travel and by encouraging efficient travel (e.g., walking, cycling, public transport). There are a variety of ways to discourage inefficient travel, including road pricing, congestion pricing, and high vehicle registration fees and taxes. These are vital to counteract the saving from new mobility technologies. Efficient travel is encouraged in a variety of ways, including planning and zoning for compact, mixed-use cities centered around public transport, as well as the construction of infrastructure that supports and prioritizes walking, cycling, and public transport.

Cheaper, Better Transit

Through Sustainable Shared Mobility, new technology could greatly expand the reach of transit, save money and free up precious urban space. Lower operating costs would result in a combination of more transit service and lower fares, if funding levels are kept constant. Better service drives higher ridership and more efficient use of urban space. Service on high-demand

[1] Mason, Jacob, Lew Fulton, and Zane McDonald. "A Global High Shift Cycling Scenario: The Potential for Dramatically Increasing Bicycle and E-bike Use in Cities Around the World, with Estimated Energy, CO2, and Cost Impacts." (2015). https://www.itdp.org/the-benefits-of-shifting-to-cycling/

Image: Sustainable Shared Mobility Principles

A consortium of transport experts, led by Robin Chase, created the 10 Shared Mobility Principles for Livable Cities, which are designed to help guide urban decision-makers and stakeholders toward the best outcomes for all.

Image: Sustainable Shared Mobility Principles

routes could become more frequent, creating more profitable routes, which could lower costs or subsidize less profitable routes. More service on other routes could attract or retain more users, leading to more profitable service, allowing for more service. This creates a virtuous circle of expanding transit use and more efficient use of transportation resources.

On very-low-demand, heavily subsidized routes, which exist primarily in wealthy countries, there is potential to replace some fixed-route services with more on-demand shared car or van services. These services may be able to provide better access to very-low-demand areas at lower cost than fixed-route services. If these on-demand services are connected

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to other fixed-route transport services, these could expand the coverage of public transport, serving more people. It should be stressed, though, that this only applies to very-low-demand, heavily subsidized services. [2]

Paratransit users would similarly benefit from Sustainable Shared Mobility. Paratransit, or government-supplied and subsidized door-to-door transportation, is essential for people with mobility issues that prevent them from using public transport. In many places, government agencies are poorly equipped to run such services but are legally mandated to do so. The result is incredibly high costs and poor service, which must be scheduled days in advance and within a large time window. In the United States, the average cost for agencies to provide a paratransit trip was $29.30.[3] By using on-demand ride-hailing technology with drivers and vehicles capable of moving mobility-impaired people, the paratransit trip operating costs could be cut dramatically and the convenience for users greatly increased. Instead of inflexible and inconvenient scheduling, users could book trips virtually on demand. With more demand for drivers and vehicles, wait times decrease, leading to greater freedom and autonomy for paratransit users. Vehicle electrification and automation could further reduce costs, although assistants would remain necessary to help those requiring assistance.

Better, Safer Cycling

Across the world, the recent explosion of interest in urban cycling has led to better infrastructure, which has, in turn, led to more cycling. From Pune, India, to Dallas, Texas, cities are investing in high-quality cycling infrastructure. However, one of the biggest barriers to building more comprehensive cycling infrastructure has been the vigorous objection from car owners and politicians to repurposing car space. Even seldom-used parking spaces are defended. Near ITDP's office in Washington, DC, bicycle lanes were nearly defeated in order to preserve parking spaces that sat empty 92 percent of the time. [4, 5] The advent of shared vehicles and automated vehicles presents an exciting opportunity to repurpose street space for bicycles, but this is only possible through Sustainable Shared Mobility.

In a Sustainable Shared Mobility future, the increase in vehicle utilization will reduce the need for car parking. Currently, most automobiles are parked for 95 percent of the time [6], and in the U.S. the number of parking spaces is estimated to be around 500 million, with some speculating that it could be as high as 2 billion.[7] With 263 million passenger vehicles in the U.S., that's at least two spaces per car. In a Sustainable Shared Mobility future, each vehicle will be used by multiple occupants each day, greatly reducing the amount of time the vehicle is idle and needs parking. This would free massive amounts of space in urban areas, and particularly on-street parking spaces, which are well-suited for bicycle infrastructure. This shift is most dramatic in the densest parts of the city, where parking is most expensive to build and where bicycle infrastructure is most critical and demand is highest for safe cycling. Fewer solo car trips and more people per vehicle will lead to fewer vehicles on the streets and less space needed for driving. This allows more space to be devoted to cycling, with less political resistance from drivers to repurposing excess space to cycling.

In addition, the safety benefits of automated vehicles are largely undisputed. The death toll of human-driven vehicles is staggering, estimated at 3 million people in 2015 [8] —a public health crisis that goes unreported because it has been around for so long. Since automated vehicles can be programmed to follow the road rules more precisely and do not become sleepy, distracted, impatient, or angry, they should result in a dramatic reduction in road injuries and deaths. This, too, should lead to a safer environment for cycling, although much work remains to ensure that people on bicycles are well-incorporated into automated driving patterns.

There are, of course, many challenges to address. The loss of employment for transit drivers and paratransit schedulers, for example. There is also a potential loss of accountability when services are contracted to private corporations, although this could be managed through improved regulation. Despite these and other real challenges, the benefits are overwhelming. Focusing on compact cities and prioritizing walking, cycling, and transit will harness the full benefits of Sustainable Shared Mobility to create virtuous transportation cycles that improve access, safety, and equity for everyone.

See more at **sharedmobilityprinciples.org**.

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[2] http://humantransit.org/2017/05/the-receding-fantasy-of-affordable-urban-transit-to-your-door.html

[3] GAO. 2012. "ADA Paratransit Services: Demand Has Increased, But Little Is Known About Compliance." GAO-13-17, November. http://www.gao.gov/assets/660/650079.pdf

[4] https://ggwash.org/view/32465/alexandria-delays-king-street-bike-lanes

[5] https://www.alexandriava.gov/localmotion/info/default.aspx?id=74320

[6] Shoup, Donald C. The high cost of free parking. Chicago: Planners Press, 2005.

[7] http://www.nytimes.com/2012/01/08/arts/design/taking-parking-lots-seriously-as-public-spaces.html

[8] http://www.who.int/mediacentre/factsheets/fs310/en/