



Beyond Static Routes and Schedules: Public Transit Agencies as On-Demand Bus Operators

Public transportation in the United States is at a crossroads. Powerful technological and social forces like the advent of transportation network companies (TNCs) and the rising cachet of urban living are reshaping the political economy of surface transportation, presenting transit agencies and their federal partners with a historic opportunity: embrace Mobility On-Demand (MoD) to increase ridership and utilize infrastructure more efficiently or, alternatively, double down on the fixed-route model that has defined transit for over a century and abandon MoD to the private sector.

Over the past decade, transit agencies have adopted new digital technologies like mobile ticketing, real-time bus tracking, and automated dispatch. While these innovations have resulted in incremental improvements to fixed-route service, in 2016 virtually all public transit systems in the United States remain configured around static routes and schedules, just as they have been for decades. This design, of course, was once eminently sensible: aggregating people at fixed nodes and then loading them into high capacity vehicles at predetermined times created economies of scale and made transit almost universally affordable. To be sure, there will always be a need for fixed routes on high-demand corridors. Today, however, MoD in general and on-demand *bus* technology in particular provide public transit agencies with new ways to democratize mobility while strengthening fiscal sustainability.

The Federal Transit Administration's (FTA) new Mobility On-Demand Sandbox program offers an encouraging signal that the Department of Transportation intends to facilitate intelligent and responsible innovation. The primary question, therefore, is no longer if transit agencies will leverage MoD, but rather how they will do so. In broad strokes, they have two options: use cutting edge technology to operate real-time, on-demand bus service themselves or outsource some passengers to non-dedicated services like Via, Uber, or Lyft. Since there is a general consensus that there is no "one size fits all" solution to transit challenges and that the public almost always benefits from transit-rich environments, it behooves the FTA to experiment with both of these options, evaluate and compare the results, and then develop policies to fund and promote the most deserving models. We have every confidence that this is exactly what the FTA intends to do. With that in mind, this position paper briefly highlights the social and economic benefits of agency-operated on-demand bus service.

The Case for On-Demand Public Bus Service

Entrepreneurs and private companies have been at the forefront of technological change in transportation. Recent advances like on-demand bus service (Via),



carsharing (ZipCar and Car2Go), ridesourcing (Uber and Lyft), are obvious to all. And yet, transportation touches too many aspects of American life to delegate the stewardship of MoD, easily the biggest revolution in surface transportation in over half a century, exclusively to private companies; the public sector has a meaningful role to play too while recognizing, of course, that private enterprise should remain the primary engine of innovation.

History offers a useful lesson: in the twentieth century, one of the most potent (and overlooked) causes of public transit's slow decline was that the cost of private automobile ownership relative to automobile quality fell much more rapidly than the cost of a transit ticket relative to the quality of a transit trip.¹ Transit was marginalized, in other words, in part because the car industry just innovated faster. This innovation gap had significant socioeconomic consequences. As car ownership became more desirable and relatively more affordable, the people who continued to use public transit (outside of a few major cities like New York and Boston where transit usage remained high) typically did not have a better option; when the middle class decamped en masse to the comfort of private cars, transit was recast as a kind of welfare service, creating a vicious cycle of declining political and fiscal support.

Today, by using algorithms to aggregate passengers in real time and dynamically route vehicles, on-demand bus technology can allow agencies to empower transit-dependent populations with the convenience of semi-custom trips while, at the same time, extending transit's reach to "choice" riders who otherwise use private vehicles and car services. If the public sector forgoes the opportunity to develop its own on-demand bus capabilities and simply outsources rides to TNCs, it risks freezing the most vulnerable members of society out of the MoD revolution. Over the medium and long term, moreover, the gradual convergence of autonomous driving and MoD could pull more "choice" riders off transit, thereby whittling away at political support for transit as a truly *public* service and further undermining mobility options for the most disadvantaged communities.

Fortunately, public transit agencies do not have to choose between social and fiscal responsibility. Using new tools, they can shift from a capacity to a demand based service model -- where appropriate -- upgrading the rider experience, promoting equity, and dramatically lowering the cost per trip compared to conventional demand response:

- *Building Ladders of Opportunity* -- By operating on-demand bus service, public transit agencies will connect disadvantaged communities to economic

¹ Robert Gordon makes this point in his book *The Rise and Fall of American Growth: The U.S. Standard of Living Since the Civil War*, Princeton UP, 2016.



opportunities and healthcare in a cost-effective way, ensuring that on-demand mobility is available to *everyone* who needs it.

- *Enhancing Workforce Efficiency* -- On-demand bus technology will improve transit productivity by transporting more riders per vehicle per hour compared to conventional demand-response service.
- *Making Government Smarter* -- Agency-managed on-demand bus service can provide first/last mile connectivity, optimize conventional demand-response service, and improve the productivity of underperforming fixed-routes without the massive capital expenditures traditionally associated with infrastructure development, thereby returning more mobility on every tax dollar invested.

Maximizing the FTA's Operating Funds

Unfortunately, the availability of beneficial technology does not ensure that it will actually be used, especially when the decision-makers (local transit agencies in this case) face daunting resource constraints. Policy innovation on the federal level or, more specifically, the creation of a funding mechanism enabling transit agencies to experiment with a wide variety of MoD models, is the "last mile" on the road to bringing public transit into the 21st century -- the "first mile" was the FTA's visionary decision to launch the MoD Sandbox.

Whether agencies outsource rides to non-dedicated vehicle fleets or operate on-demand bus service themselves, they confront a similar challenge: financing the actual operation of MoD service. Connecting agencies to the resources they need, therefore, means updating the FTA's subsidy formula, which currently covers a higher percentage of capital expenditures than operating expenditures. This financing model, like the fixed-route configuration of transit more generally, made sense before MoD was possible because it was necessary to spend capital dollars on costly passenger loading and unloading areas and expensive rolling stock in order to create economies of scale. Today, however, virtual infrastructure -- like real-time passenger aggregation and dynamic vehicle routing systems -- creates similar cost efficiencies without the need for large capital investments, freeing up the DOT's limited capital dollars to be invested where they are needed most.

That said, MoD is obviously new to the public sector, which makes it difficult to forecast ridership and fare revenue. In order to encourage transit agencies to pilot different kinds of MoD models, it would be wise for the FTA to fund more of the operating costs than it has traditionally covered, at least during the term of the Sandbox program. Sharing more operating risk will facilitate more service model experimentation and maximize the program's value to the FTA as a learning opportunity.



Eventually, Congress will decide what kinds of new transit services merit public funding based, at least in part, upon its review of the MoD program's data. Our hope is that the FTA recognizes the virtues of agency-operated on-demand bus service: its alignment with the high-minded ethos of transit's public mission and its superior economic productivity compared to private car services (true "ridesharing," after all, is the best way to lower the cost per trip). Seizing this opportunity, we believe, will make transit more useful to "dependent" riders, more attractive to "choice" riders and, ultimately, more fiscally and politically resilient during an era of unprecedented change and uncertainty.