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NACTO

Robotaxis Aren't Coming, They're Here

A PRACTICAL GUIDE FOR CITIES TO GET STARTED

Responding to an escalating challenge on city streets

Robotaxis are here, and cities are the current and future testing and deployment grounds of this new technology.

Company narratives promote robotaxis as a miraculous remedy to the traffic-safety crisis on U.S. streets and a transformative mobility option, particularly for people with disabilities. While cities are cautiously optimistic about these promises in the long term, robotaxi operations are already taxing cities' transportation networks and have yet to come close to meeting these lofty promises.

Under current regulatory frameworks, city officials have few — if any — tools to guide these companies' operations according to city goals. Further, city staff rarely have access to data to understand the repercussions of robotaxis on the transportation network, including impacts to congestion and the safety of those inside and outside the vehicle.

To continue providing an effective, safe, multimodal transportation system for people and goods, cities must prepare now for robotaxi operations. As cities have learned from previous arrivals of new technologies, such as ride-hail companies and free-floating bikes and scooters, it is necessary to properly manage these new services through regulation, partnerships, and open communication with service providers, government staff, and stakeholders.

Defining Robotaxis

Autonomous vehicles come in many forms, from freight and personal delivery vehicles to sidewalk robots and personal cars. To date, the most extensive and significant investment and impact of autonomous vehicles has been the rapidly expanding, large-scale testing and deployment of fleets of for-hire autonomous vehicles (robotaxis).

These services operate similarly to ride-hail companies — without the driver. This is distinct from vehicles that are owned and operated by individuals, and the deployment of autonomous public transit, which introduce different dimensions to effective city planning and management.

A permissive federal regulatory environment and continued technological development mean robotaxi services are launching in cities rapidly, sometimes with little notice. To meet this pressing need, this practitioner paper focuses on preparing cities for the arrival of for-hire, robotaxi passenger services and outlines strategies for getting started.

With this practitioner paper, city staff will be able to:

- Organize and begin internal work to address a rapidly expanding new technology.
- Build partnerships and relationships necessary for successful day-to-day and strategic management of robotaxi operators.
- Draft policy and programs to take the next steps in creating space for robotaxis while advancing safe, equitable, and multimodal transportation networks.

While many of these recommendations apply to all cities, some will be more or less applicable depending on a city's unique geographic, political, and programmatic contexts. A city's level of regulatory authority, its relationship with state or provincial agencies, interactions with AV companies, as well as location, geography, and weather, are all factors that influence robotaxi operations and regulations.

Cities are generally drawing on existing general funds to support this work. Instead, staff resources are pulled away from other projects or programs. In the absence of assessed fees (similar to ride-hail taxes or shared micromobility fees) that could support new staff positions, this document is structured to help cities prioritize time and resources based on what they have available.

Getting Started: Building a Foundation

Cities need to be proactive. Even before robotaxis start testing and operating on public streets, cities should:

1. Understand the legal and political context of their city.
2. Identify a robotaxi point person.
3. Start learning from peer cities that have already started this work.

Understand your city's legal and political framework

Cities can take many steps to improve how robotaxis interact with the transportation network within their regulatory environment, which varies significantly by state and province. New robotaxi regulation likely will be informed by the existing legal and political context for autonomous vehicles writ large, ride-hail services (such as Uber and Lyft), taxis, and limousines at the state and local levels.

Consider the full context of how state legislation, provincial responsibilities, regulations, and definitions may limit or enable municipal oversight and regulation.

Many cities are fully preempted by state or provincial law from regulating or overseeing robotaxi testing and operations, making it challenging to incorporate robotaxi fleets into city transportation networks in ways that support city transportation goals. In the U.S., Congress has proposed legislation that could further strip authority from both states and local jurisdictions.

Transportation department staff can conduct this research, but their work will benefit from collaboration with the city's legal department, government affairs team, mayor's office, other local elected officials working on the issue, and any neighboring jurisdictions.

This work is best initiated before any robotaxi fleets are testing or operating locally, but can be done at any time — and should be monitored regularly. A strong understanding of the regulatory environment will focus discussions on what can be meaningfully achieved by cities.

Key considerations:

- **Understand state or provincial laws and definitions:** What does your state or province define, regulate, allow, or preempt when it comes to regulating autonomous vehicle testing, robotaxi customer service, ride-hail services, taxis, limousine service, or other for-hire vehicles? How does each definition cover or exclude robotaxis? Would ride-hail licensing programs apply to robotaxis? If relevant in your state or province, review existing regulations, permit processes, and permitted autonomous vehicle operations.
- **Review local for-hire vehicles policies and regulations:** What are the existing city definitions and policy tools relevant to autonomous vehicles, ride-hail services, and other for-hire vehicles operations?
- **Identity opportunities and limitations:** What elements of the legal framework limit the potential for your city to regulate robotaxis? What regulations and laws can you *apply* to robotaxi operations, even if you're preempted from making AV-specific regulations? Are there any relatively easy changes to definitions that could create a more supportive environment?
- **Consider liability:** What new liability issues may arise with the introduction of robotaxis? How do these liability concerns impact local government? How do they impact other roadway users?

Cities may find themselves in one of three common scenarios:

- **Fully preempted:** The state or province clearly and explicitly prohibits local jurisdictions from regulating any component of robotaxi testing or operations. This is the case in Florida and Texas, among other states.
- **State-led regulations:** The state or province establishes a permitting process to govern AV testing, robotaxis, or other for-hire vehicles, superseding local jurisdictions' authority to lead such permitting. This is the case in California.
- **Framework in progress:** The state or province is generally interested but concerned. Its government, administratively and/or legislatively, will likely create a process for permitting and regulating AVs and robotaxi operations that gives local jurisdictions regulatory authority. This is the case in states such as Washington and Illinois.

Identify a robotaxi point person

Cities need a single primary point of contact to coordinate and organize communications with robotaxi companies. Typical responsibilities of a robotaxi point person include:

- Understanding and staying aware of citywide robotaxi operations.
- Building relationships with primary contacts at all robotaxi companies and any operations partners. For example, this person may also coordinate with Uber if Waymo offers rides through the Uber platform.
- Establishing open lines of communication with robotaxi companies to address issues, understand their limitations, and identify opportunities.
- Documenting all conversations with robotaxi companies and other operators and sharing them with relevant stakeholders.

A successful robotaxi point person should have strong communication skills, be able to navigate internal politics and relationships, understand city operations, and represent the city's priorities and interests with private robotaxi companies. If this work needs to be split across multiple staff due to capacity constraints, ensure there is still a single point person to coordinate the work and maintain transparent communication.

As robotaxi testing and deployment progress, private companies may need to interact directly with other city staff, such as first responders and operational teams; however, the point person should always be kept apprised of those communications and get regular updates. Robotaxi companies must also know how to contact emergency responders if a passenger needs immediate medical assistance.

If you do not yet have robotaxis in your city, consider proactively reaching out to companies you anticipate might want to operate there in the future to establish communication expectations.

Learn from your peers

The city point person should participate in knowledge-sharing opportunities with other cities. Learn what to expect from city staff where robotaxis have already deployed and exchange insights with peers in your region or state. Explore similarities and differences in your situations and discuss what has worked and what has not. These types of forums also help cities coordinate policies and present a unified vision for robotaxi policy and regulation going forward.

NACTO member agencies:

- Join NACTO's Autonomous Vehicles Working Group to share experiences with and learn from your peers across the U.S. and Canada. The Working Group includes cities with years of experience with fleets of robotaxis carrying passengers as well as those where operations have yet to be announced. Collectively, the group offers a sounding board for ideas and a body to solve shared challenges.

Other national policy organizations. Join the conversation with:

- Open Mobility Foundation (OMF). The Mobility Data Specification (MDS) and Curb Data Specification (CDS) are free, open-source digital tools developed by cities and private mobility providers that can help cities manage transportation in the public right-of-way. The OMF hosts an MDS working group that discusses data-sharing between cities and private mobility providers, including robotaxis.
- National League of Cities (NLC). NLC is working directly with staff from Congressional offices and Congressional committees to offer the city perspective on autonomous vehicle issues with legislators.
- Partners for Automated Vehicle Education (PAVE). PAVE brings together the private and public sectors to coordinate on autonomous vehicle policy. They host a public-sector advisory council to raise public awareness of automated technology and to discuss impacts on public agencies. The group includes cities, state departments of transportation, and metropolitan planning organizations.

Getting Organized

Robotaxi operations will affect multiple city departments, and managing a city's response will require new or deeper coordination between staff. The robotaxi point person, or other designated lead, will need to build an internal structure and organizational approach to everyday issues and to unexpected and urgent challenges.

Create a working group

An interagency robotaxi working group or task force provides a structured means of internal communication across city departments regarding robotaxi policy, rules, and operations. Include, at a minimum, city staff with the following areas of expertise: policy analysis, legal, technology, traffic engineering, communications, law enforcement, fire, and emergency response.

Typical steps for establishing a working group:

- **Identify a chair.** This should be an individual in a leadership or executive role or the city's point person.
- **Create a decision-making framework.** Stakeholders will represent different interests and have different priorities. Sometimes the working group can accommodate multiple perspectives, and other times it must make a single decision among competing priorities. Agree on a decision-making process early on.
- **Organize meeting notes and agendas.** Build a file management system that everyone can access, and ensure that agendas, meeting notes, and contact information are saved and updated regularly.

Critical Working Group Participants

- **Senior transportation leadership:** If the designated point person is not part of the city's transportation agency leadership, the working group should include high-level leadership from transportation functions. This includes the leadership from a city department of transportation, public works, and traffic operations.
- **First responders and law enforcement:** First responders are on the ground, interacting with robotaxis in emergency situations. Transportation department staff who regulate or collaborate with robotaxi companies have found that their most valuable relationships are with their police and fire departments. First responders know what the pain points are and can verify — or discredit — each company's stated operational and emergency protocols.

  Working collaboratively with the police and fire departments aligns goals internally and creates a more effective case for change at the state or provincial level. When

making the case for local regulatory control, police and fire department leaders can often make more compelling cases than transportation department leaders.

First responders will need direct access to robotaxi companies so they can:

- Respond to emergency situations involving robotaxis, including collisions, fires, and extracting people from locked vehicles.
- Remove, move, or tow vehicles from any location closed to motor vehicle traffic or where parking or idling is prohibited such as in construction zones, parks, parade routes, city parks, commercial loading zones, bike lanes, or travel lanes.
- Direct traffic flow that includes AVs and robotaxis during special events, signal outages, congested areas, or around hazards in the roadway.
- Issue parking tickets and moving violations.
- Address any other emergent issues or concerns that the company may need help resolving with first responders.

As a member of the working group, first responders will need to discuss whether, when, and how first responders can enter robotaxi vehicles and whether there are reasonable measures to reduce property damage. First responders will also need to know if the vehicles can be driven by people on scene or remotely, and how to do so. For vehicles without steering wheels or those difficult to override, the best solution in an emergency may be to use a large vehicle to physically push the robotaxi out of the way.

Robotaxi companies have led training sessions with first responders on how to interact with their vehicles. This may be successful today, but at scale, with expanded operations and more companies, each with different protocols, the logistics of managing such a complexity of vehicles will become overwhelming. The working group should grapple with this issue internally and collaborate with peer cities to propose appropriate solutions.

- **City mayors' and city managers' offices staff:** Given the more political nature of their offices, your mayors' or city managers' offices should either participate or stay apprised of the working group's activities. Autonomous vehicle and robotaxi companies will contact their offices, and those other key internal and external stakeholders, directly. The Working Group should establish a framework for sharing information internally and consolidating external responses.
- **Policy, legal, and communications staff:** These staff members will likely represent several departments or divisions in your city. Together, these experts should be

well-connected, understand the local political environment, and be open to collaborating on creative problem-solving as challenges arise.

Additional Working Group Participants

As robotaxi operations expand, additional internal stakeholders need to be involved. While their participation in the working group may be optional or as-needed, well-developed relationships between this wider group are important for consistent internal coordination and communication.

- **Teams permitting lane closures and special events:** These teams will need to develop, support, and review communication strategies to ensure closures are clearly communicated to robotaxi companies. Robotaxis interpret road closures differently from humans, and cities should provide fact sheets for permit holders on how to mark lane closures so robotaxis and other automated vehicles can process the information correctly. Their inclusion in the working group will illuminate these specific needs across city agencies, and the working group can help develop and distribute fact sheets and other new, important materials.

- **Technology and data privacy experts:** Your city will need to request data from robotaxi companies as part of the city's management of robotaxi services and transportation networks overall. (*Refer to develop a data management plan below.*) Given the potential for future sensitive data requests, city technology experts can help navigate data privacy concerns and data management needs.

- **Planners and engineers working on street design, Vision Zero, parking or curb management, and traffic operations**: Including many disciplines within the transportation department can help anticipate and address challenges. Some cities have leveraged Vision Zero working groups to build on the interdepartmental relationships established to support safety. Parking or curb management teams can help create a process to regulate where and how robotaxis can access passenger pick-up and drop-off areas and how to enforce any illegal pick-up or drop-off operations.

- **City planners focusing on land use and zoning code:** Robotaxis will need space for vehicle storage and, depending on the company, charging. These uses can disrupt communities by adding traffic to local streets and causing noisy overnight operations. Anticipating these concerns with planning staff will help identify whether the zoning code needs to be updated or clarified, and how to engage with different neighborhood stakeholders.

Building a Framework for Problem-Solving

Once you've understood the local legal and political context, designated a point person, and organized the working group, it's time to focus on sharing information, identifying concerns, and collaborating on solutions to operational challenges. The working group can discuss and be tasked with:

- Creating a plan for robotaxi operations
- Collaborating with a broad group of external stakeholders
- Developing a data management plan to collect and monitor performance
- Demonstrating the cost impacts associated with robotaxi operations
- Anticipating operational challenges

Create a plan for robotaxi operations

Formally or informally, the working group should identify guiding principles, goals, or develop a strategic plan for working with robotaxi companies. These documents can help bring people up to speed and support decision-making. **Build on existing policies to determine how robotaxi operations fit into the city's goals, not the other way around.** A basic plan for robotaxis should explore the following elements:

- **Develop goals, priorities, and guiding principles:** A formal city document, such as "Robotaxi Principles" or a "Robotaxi Strategic Plan," can present your city's perspective on robotaxi testing and deployment, including how it could help or harm city transportation, equity, and sustainability goals. The document can serve as a source of information for robotaxi companies seeking to test or deploy in your city and could include a list of items they should address before beginning operations. During development, consider whether it would be helpful to include robotaxi testing and operations in these documents as well.
- **Prioritize equitable, accessible service:** Many cities want to ensure that robotaxis provide citywide service and equal access throughout the city. Further, cities will want to understand how robotaxis services will accommodate people with disabilities, including those who use wheelchairs and other assistive devices. Consider what equal access would mean for your city and what strategies would incentivize or require robotaxis to align with your city's goals and policies for advancing equity.
- **Align on messaging:** A centralized communications and media strategy across city departments will help the city speak with one voice on robotaxi issues. Some cities

have found it helpful to allow each department to speak to the media on its own behalf rather than on behalf of the city as a whole; this is particularly important for police and fire departments. However, common talking points should be used.

- **Bring everyone up to speed:** Create baseline education materials for city staff about robotaxi operations in our city. Include information about the local regulatory environment at the state and local level, an overview of automated vehicle technology and common operational models for robotaxis in your city, a comparison to peer cities, and typical challenges to expect with robotaxi testing and operations.

- **Review local land use regulations**: Cities retain authority over local land use policy. As many robotaxi companies operate electric vehicles, they will need to develop charging sites to recharge and maintain their fleets. Cities can use their land use authority and approval of these robotaxi commercial fleet locations to leverage access to data to monitor performance.

Collaborate with a broader group of stakeholders

As robotaxi testing and operations expand, your city will need a framework for when and how to collaborate with a broader range of stakeholders. The working group can develop this shared approach. Depending on local priorities, some of those stakeholders include:

External Transportation Experts

- **Transit agency staff:** Robotaxi operations will impact transit operations. Anticipate responses to typical concerns, such as idling at bus stops or blocking streetcar or light rail operations. Include staff from the transit agency who can identify and document disruptive behaviors and collaborate on developing supportive policies.

- **State and provincial transportation policy staff:** Contact state policy staff working on autonomous vehicles and robotaxis early and often to provide your city's perspective. Robotaxi operations are evolving quickly, and your voice can be a powerful tool for advocating for better policy at the state and federal levels.

Community Partners

- **Labor organizers and workforce development advocates:** Robotaxi adoption could affect the local workforce, especially people currently driving for ride-hail and other for-hire car services. Work with organizers and advocates to understand the potential impacts and collaborate on strategies to mitigate impacts.

- **School district representatives:** Relationships with local school districts are valuable, as school buses and school zone pick-ups and drop-offs can be difficult for robotaxis to navigate. School zones are complex environments to navigate during pick-up and drop-off. Autonomous vehicles do not always correctly interpret

school bus stop arms and school zone speed limits. Working directly with schools and districts can help identify challenges and solutions.

- **Colleges and universities:** Undergraduate and graduate students represent a large potential market for robotaxi services, including on both public and private streets. Partnerships with higher education institutions can help identify potential needs for educating users and for ensuring that robotaxis correctly interpret vehicle prohibitions. Young adults may also be more likely to intentionally disrupt robotaxi operations, potentially leading to congestion and safety concerns for people inside and outside the robotaxis.
- **Community leaders and stakeholders**: Consider who else may have a vested interest in robotaxi operations, such as business improvement districts, advocacy organizations, neighborhood councils. Contextualize your priorities with those of other community stakeholders. Consider how their perspectives can inform city policy and communications with robotaxi operators.

Develop a data management plan to monitor performance

Under current national, state, or provincial laws and regulations, cities may be limited on the types of data that they receive from robotaxi companies. Cities should still request the data they need and use the data they have to evaluate robotaxi performance. This includes creating a process for collecting and aggregating information.

- **Clarify your city's data needs:** Ask robotaxi companies to share data, specify which data points your city wants, the level of detail the city requires, how often the city would like to collect it, and how it will be used. At a minimum, cities should ask robotaxi companies for the following data:
  - The robotaxi service area map
  - The number of robotaxis operating on city streets
  - The miles driven with passengers and without passengers
  - Robotaxi incident information
  - Origin and destination trip information

  Data sharing should be required as part of a city's permitting program, but without a formal requirement, robotaxi companies are unlikely to provide the data outlined above.
- **Using digital infrastructure tools:** Cities should consider using the Open Mobility Foundation's Mobility Data Specification (MDS) or Curb Data Specification (CDS), which standardize data reporting without including personally identifiable information. Both MDS and CDS are application programming interfaces (APIs) that

facilitate the exchange of anonymized vehicle data between private mobility operators, including robotaxis, and cities.

MDS and CDS also provide a digital mechanism for cities to communicate rules and regulations to mobility operators. MDS includes information on vehicle status, location, and trip routes. CDS data includes digital curb locations and regulations, real-time and historic commercial events, and curb usage session details to determine occupancy, usage, and other aggregated statistics.

This digital infrastructure can help communicate automatically generated stay-away zones around emergency response and develop a work zone data exchange feed. Using a standardized framework provides predictability and certainty to both the public and private sectors, reducing uncertainty for robotaxi companies entering new markets.

- **Accessing information in the absence of data reporting:** Some cities cannot enter into formal agreements or permitting programs with robotaxi companies to require data sharing because of state preemption. Cities will need to create a process for gathering and aggregating robotaxi information if companies don't share data directly. Existing communication channels, such as 311, service request hotlines, and city council member offices, enable city staff to gather insights into robotaxi operations on city streets and help local policymakers make decisions with limited information.
    - Through your working group or task force, establish protocols for distributing and summarizing incoming calls or emails, including who should receive them, to ensure all relevant city staff receive the information.
    - Work with 311 and other stakeholders to collect quantitative and qualitative data on a regular basis.
    - Consider collecting or reviewing existing video footage to calculate robotaxis volumes and observe general operations.
    - Work with law enforcement to document violations. Cities will need to ensure that local crash reporting forms include a checkbox for robotaxis.
    - Create a process for documenting violations, such as entering a construction zone or another road, blocking bike lanes, or other instances that disrupt traffic operations.

Demonstrating the cost impacts associated with robotaxi operations

Robotaxis are another mobility service that cities must manage with limited staffing and resources. Like other recently-emerged technologies, such as ride-hail services and e-scooters, cities need to create a fee structure that covers the cost of managing robotaxis on city streets and for utilizing curb space.

A fee study should estimate the resources required to manage operations and address challenges. Include the time it takes to train first responders as well as the time first responders spend responding to incidents and challenges. This is a common practice already used for other passenger services and curb management. Cities should establish a mechanism to cover city costs.

Anticipate operational challenges

Expect to see similar scenarios in testing and deployment as other cities have when robotaxi operations are introduced or expanded. Inevitably, robotaxis will block first responders and public transit operations, and city or transit teams will have difficulty removing or towing disengaged vehicles. City planners will face difficulty siting and approving large fleet charging facilities. Other common problems that your working group should seek to address include:

- Removing stopped vehicles — with and without steering wheels — from spaces where vehicles are not allowed (e.g., construction sites, open streets events)
- Protocols for overriding unresponsive or stopped robotaxis
- Ticketing vehicles parked or idling illegally
- Issuing moving violations

Consider proactively coordinating with robotaxi companies on large event pick up / drop off logistics, major street closures (planned and unplanned), nightlife pick up/drop off, and time-based speed limits, such as in school zones.

Although city departments must maintain safe roadway operations, especially in emergency situations, the responsibility for safe operations is held by the robotaxi companies. Every city has a long maintenance backlog, aging infrastructure, high demand for curb space, expanding multimodal infrastructure, and frequently deployed temporary traffic plans for construction and special events. Robotaxi companies must navigate these streets as they exist today. The onus is not on cities to update or rebuild infrastructure to support autonomous operations.

Additional Robotaxi Resources

National Association of City Transportation Officials. *Principles for Autonomous Vehicles on City Streets*. 2024.

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