

SIP-adus Workshop 2022

SERVICE & BUSINESS IMPLEMENTATION:

**ROBOTAXIS IN THE U.S. –
REGULATORY FRAMEWORK &
LEGAL DEVELOPMENTS**

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OCTOBER 12, 2022



SIP-adus

Innovation of Automated Driving for Universal Services

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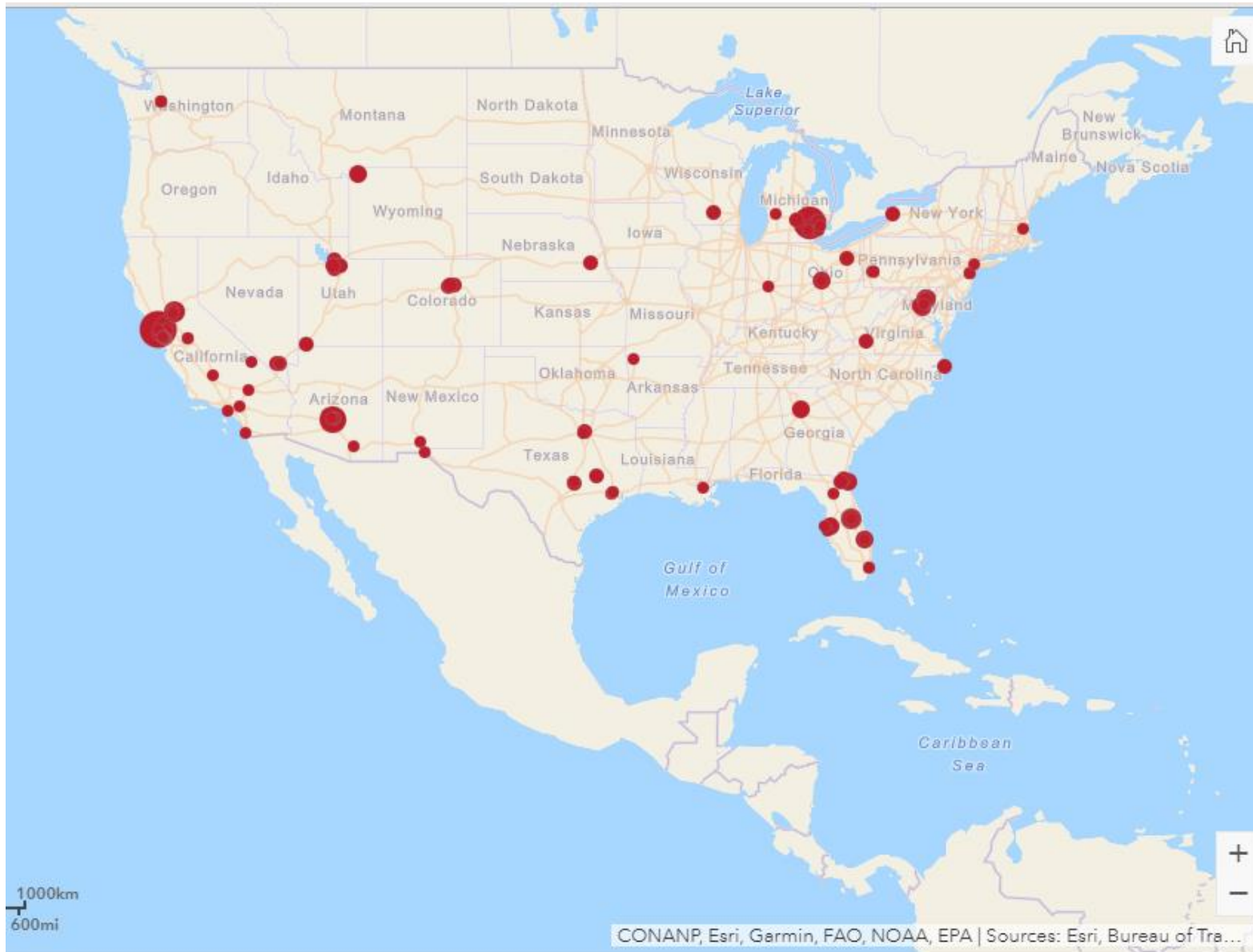
- **Former Commissioner/Chair/CEO & General Counsel, New York City (NYC) Taxi & Limousine Commission (TLC)**
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AUTONOMOUS VEHICLES EXPERIENCE & PROJECTS

- Co-chair, **Legal Forum on Autonomous Vehicles**, National Academy of the Science's Transportation Research Board (TRB)
- U.S. delegate/planning committee member, **6th EU-US Transport Research Symposium** on "*Socio-economic impacts of Automated and Connected Vehicles*" (TRB and European Union)
- **Automotive Vehicles & Shared Mobility Forum** (TRB)

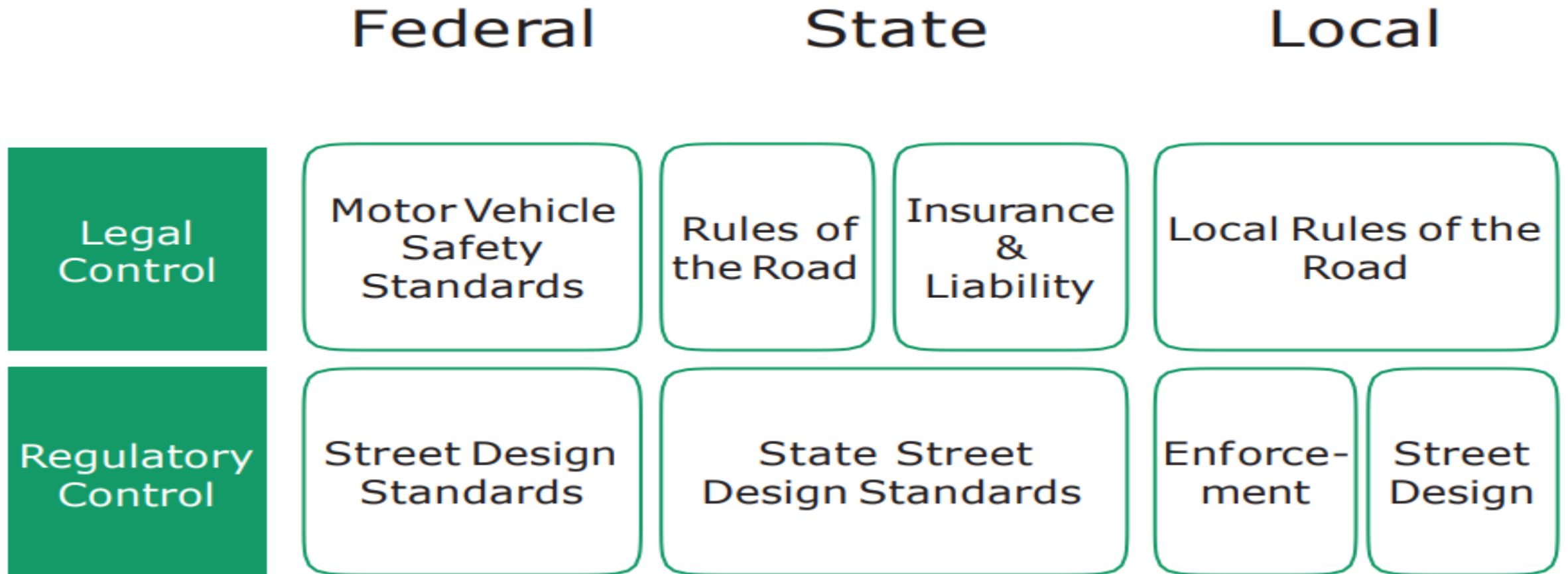


To access the report, visit:
<https://nap.nationalacademies.org/read/25359/chapter/1>



AUTONOMOUS VEHICLES TESTING, DEPLOYMENTS, & PILOTS

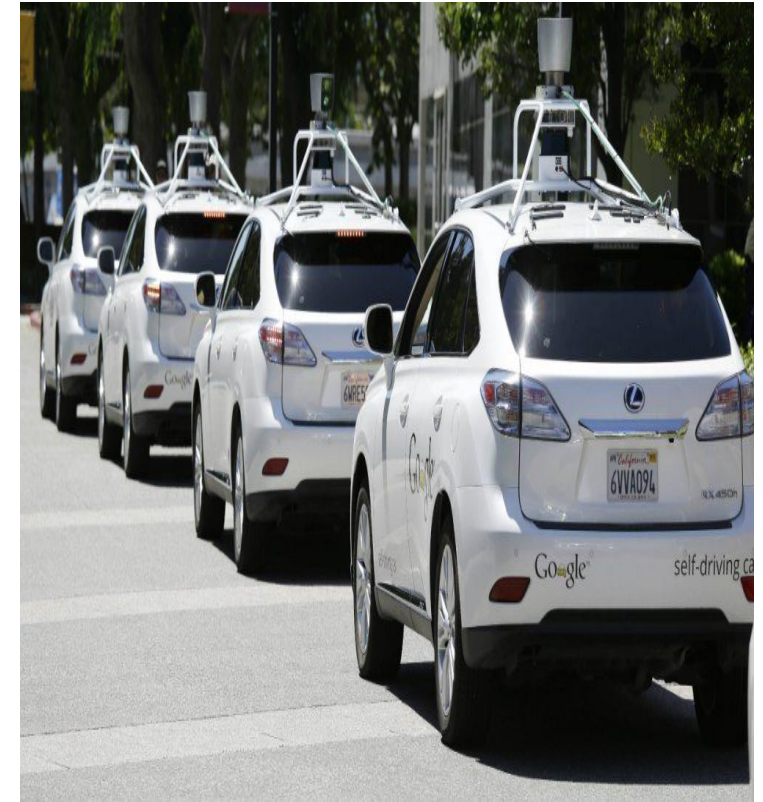
U.S. LEGAL FRAMEWORK FOR AUTONOMOUS VEHICLES



Source: <https://nacto.org/wp-content/uploads/2016/07/NYCDOT-Autonomous-Vehicles-and-the-City.pdf>

TESTING & DEPLOYMENT IN THE U.S.

- Several states have adopted regulations governing the testing and demonstration of AVs, and testing has been underway for years in **Arizona**, **California**, **Florida**, and **Nevada**, among other states.
- **Florida** and **Arizona** have less regulations and compliance regulations, while **California** has a more comprehensive framework for testing and deployment.
- **State laws** typically *preempt regulation by cities*, but not always.
 - **Nevada**—the first state to authorize autonomous vehicles in 2011—explicitly preempts local regulation of AV testing and prohibits local governments from imposing any tax, fee or other requirement.
 - In **Pennsylvania**, the City of Pittsburgh calls for companies pursuing AV testing in the City to adhere to testing guidelines, which were crafted in collaboration with stakeholders.
 - **New York City (NYC)** recently established a permit process to deploy AVs on NYC streets.



REGULATIONS TO MITIGATE RISK

- Government policies and regulation, as well as insurance rules, may also affect the analysis of duty and liability.
- **States that have AV testing regulations generally require those testing autonomous vehicles to have insurance or a bond.**
- The laws and regulations may require that the testing companies ***indemnify the government***.
- Some U.S. states have adopted statutes that ***exempt manufacturers of original vehicles and components from liability for injuries caused by retrofitted vehicles***, unless a defect already existed.



State	Automation level allowed	Human Driver Required	Liability Insurance Required; amount
Alabama	Deployment — commercial motor vehicles only	No	Yes; \$2 million
Arizona	Deployment	Depends on automation level	Yes; must have liability insurance equivalent to the minimum required under existing insurance law.
Arkansas	Deployment — commercial purposes only	Depends on automation level	Yes; "minimum liability insurance coverage requirements" under 49 C.F.R. § 387.9 (commercial property carriers)
California	Deployment	No	Yes; \$5 million
Colorado	Deployment	Not addressed	Not addressed
Connecticut	Testing	Yes	Yes; \$5 million
District of Columbia	Testing	No	Yes; \$5 million
Florida	Deployment	Depends on vehicle automation level	Yes; depends on type of vehicle: on-demand AV network must have \$1 million; fully autonomous vehicle, \$1 million liability, \$1 property.
Georgia	Deployment	Depends on vehicle automation level	Yes; a “fully autonomous vehicle” operating “without a human driver” must have liability insurance equivalent to the minimum required under existing insurance law.
Hawaii	Testing	Yes	Not addressed
Iowa	Deployment	Depends on vehicle automation level	Yes; must have liability insurance equivalent to the minimum required under existing insurance law.
Kansas	Deployment	No	Yes; must have liability insurance or self-insurance that satisfies existing insurance law.
Louisiana	Deployment — commercial motor vehicles only	No	Yes; \$2 million
Maine	Testing	No	Yes; \$5 million
Massachusetts	Testing	Yes	Yes; a variety of insurance coverages, including commercial general liability, automobile, and workers compensation insurance.

Michigan	Depends on vehicle	No	Yes; must have liability insurance equivalent to the minimum required under existing insurance law.
Nebraska	Deployment	Depends on vehicle automation level	Yes; must have liability insurance or self-insurance that satisfies existing insurance law.
Nevada	Deployment	Depends on vehicle automation level	Yes; testing requires \$5 million; "autonomous vehicle network company" requires \$1.5 million
New Hampshire	Deployment	Depends on vehicle automation level	Yes; New Hampshire requires "driverless capable vehicles" operating without a "conventional human driver" to have liability insurance equivalent to the minimum required under existing insurance law.
New Mexico	Testing	Depends on vehicle automation level	Yes; \$5 million
New York	Testing	Yes	Yes; \$5 million
New York City	Testing	Yes	Yes; \$5 million automobile insurance, \$3 million in personal liability insurance, and a minimum of \$2 million in property damage insurance
North Carolina	Deployment	No	Yes; must have liability insurance or self-insurance that satisfies existing insurance law.
North Dakota	Deployment	Depends on vehicle automation level	Yes; must have liability insurance or self-insurance that satisfies existing insurance law.
Ohio	Testing	No	Yes
Oklahoma	Deployment (effective 11/01/22)	No (effective 11/01/22)	Yes; \$1 million (effective 11/01/22)
Pennsylvania	Depends on vehicle	Depends on vehicle	No; must have liability insurance or self-insurance that satisfies existing insurance law.
Tennessee	Deployment	No	Yes; \$5 million
Texas	Deployment	No	Yes; must have liability insurance or self-insurance that satisfies existing insurance law.
Utah	Deployment	No	Yes; must have liability insurance that satisfies existing insurance law.
Vermont	Testing	Yes	Yes; \$5 million
Washington	Testing	No	Yes; \$5 million
West Virginia	Deployment	No	Yes; a "fully autonomous motor vehicle" operating without a "human driver" must have liability insurance that satisfies

TRADITIONAL U.S. LEGAL THEORIES OF AUTO CRASH LIABILITY

- Most vehicle accidents are evaluated under either a **negligence** or **products liability** framework. Typically, courts evaluate unintentional human errors under the negligence standard and unintentional manufacturing errors under products liability
- **Negligence** is failure to behave with the level of care that someone of ordinary prudence would have exercised under the same circumstances; conduct that falls below the standard established by law for the protection of others against unreasonable risk of harm.
- **Statutory liability** means the liability of a person who may be held responsible for a certain act or omission under any related applicable law.
- **Strict liability**, in criminal and civil law, is a standard of liability under which a person is legally responsible for the consequences flowing from an activity regardless of fault or intent.



TRADITIONAL U.S. LEGAL THEORIES OF AUTO CRASH LIABILITY (CON'T.)

- **Products liability** refers to liability of any or all parties along the **chain of manufacture** of any product for damage caused by that product. This includes the manufacturer of component parts (at the top of the chain), an assembling manufacturer, the wholesaler, and the retail store owner (at the bottom of the chain). Products liability claims can be based on negligence, strict liability, or breach of express and implied warranty (contracts).
- **Contract law** provides remedies for breaches of contract, **promises made in advertising, or express and implied warranties** pertaining to product quality or features.
- **Municipal tort liability** refers to civil liability imposed on municipal corporations, **local, city or state government** units for any injury caused on the public property in such area or for any harm caused by their employees. These constitute damages resulting from an injury caused by the municipality's negligent violation of another person's rights, when acting in a governmental rather than proprietary role.



WHO IS RESPONSIBLE WHEN A DRIVERLESS VEHICLE CRASHES?

- There is **uncertainty** about who is responsible for damages when a driverless vehicle crashes.
- **As vehicles become increasingly autonomous (levels 3 and 4), liability will likely shift toward parties in the C/AV supply chain, including carmakers, Tier 1 suppliers, software companies, and those responsible for the “smart” infrastructure.**
- The focus will likely be on what went wrong with the navigation, electronics, and the connected/automated parts, rather than driver error.
- The law may look to manufacturers of the vehicles and/or the infrastructure—to cover all or a portion of the liability, depending on the level of autonomy.

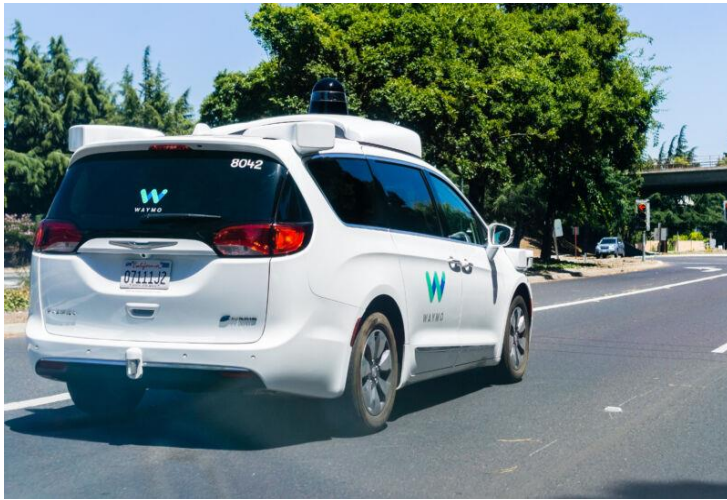


INSURANCE MODELS MUST EVOLVE FOR AVS/CVS

- AVs may not fit neatly into insurers' current risk-pooling models, which raises numerous insurance-related questions.
- Currently, under the **“user-liability model,”** vehicle **operators** are required to have insurance. The traditional approach to insurance may prove unworkable.
- **It may be necessary to extend insurance to the maker of the vehicle or the computer or automated system that is controlling the vehicle.** Insurance will need to evolve – possibly to include third-party liability insurance and product liability coverage.



ROBOTAXIS ARE ALREADY PICKING UP PASSENGERS IN THE U.S.!



Waymo One

Since October 2020, Phoenix, AZ



Cruise

Since June 2022, San Francisco
Expanding to Austin and Phoenix by end of 2022



Argo AI (with Lyft)

Since December 2021, Miami
October 2022, Austin

Transportation Network Companies (TNCS)



Taxis



Limousines



Non-Emergency Medical Transport



For-Hire Ground Transportation Modes

Commuter Vans



Livery Service



Black Cars

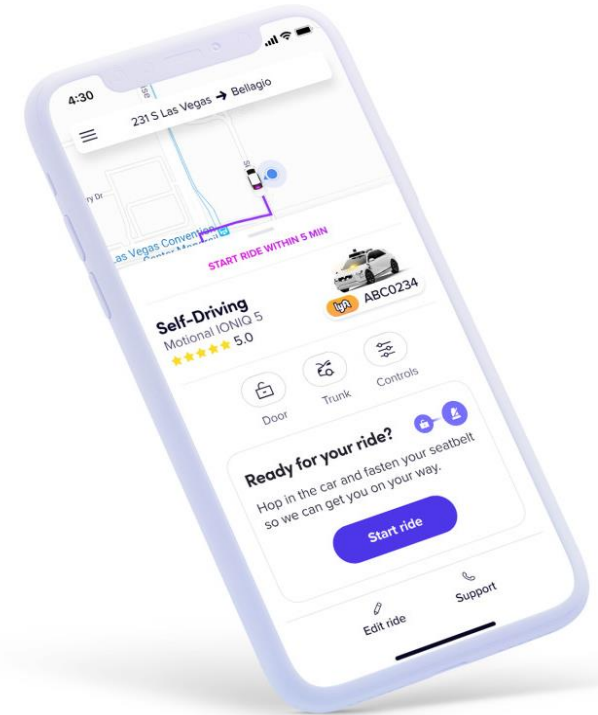


CADILLAC ESCALADE

LINCOLN TOWN CAR

ARE RIDE HAIL APPS ON A COLLISION COURSE WITH AV OEMS?

- **Cruise and Waymo** deploy their fleets through their own apps;
- **Argo AI** deploys their cars through the **Lyft** app in Miami and Austin, and **Motional** deploys cars through **Lyft** in Las Vegas;
- **May Mobility** will adopt **Via's** autonomous fleet platform to power booking, routing, passenger and vehicle assignment and identification, customer experience and fleet management as part of its new transit solution for future autonomous vehicle deployments.



LICENSING – AUTONOMOUS VEHICLE NETWORK COMPANIES?



- **California:** The California Public Utilities Commission (CPUC) is in charge of creating regulations for AVs in fleet services (e.g., taxis and ride-hailing). The Drivered Autonomous Vehicle Deployment Program and the Driverless Autonomous Vehicle Deployment Program allow participants to launch robotaxis in the state.
- **Florida:** Robotaxis (on-demand *autonomous vehicle networks*) operate under the same state laws governing TNCs. The insurance requirements for the vehicles will differ depending on whether the vehicle is transporting passengers in fully autonomous mode.
- **Nevada:** TNCs may provide service using AVs (“*autonomous vehicle network company*”). Nevada recently revised existing TNC law to authorize a monitored AV provider (i.e., a safety driver behind the wheel) to provide transportation services in the same manner and generally subject to the same requirements as a driver.

INTERNATIONAL ASSOCIATION OF TRANSPORTATION REGULATORS (IATR)

What Is IATR?

The **International Association of Transportation Regulators (IATR)** is a non-profit, professional association of government transportation officials.

- Founded in 1989, the IATR is primarily an educational organization which encourages close cooperation and sharing of information among the various government agencies that regulate transportation industries, while working to resolve common problems and promote best practices.

IATR's mission: *Multi-Modal Mobility Innovation For All!*

To engage in activities to further the principles the principles of transportation equity and affordability, sustainability, health and safety, technology innovation, open public data, and sound multi-modal governance.



www.iatr.global

IATR MEMBERSHIP

Our IATR membership now includes:

- Traditional government agencies that regulate taxicabs, liveries, black cars, paratransit and limousines
- Transportation Network Company (TNC) state regulators
- Public Transit Agencies
- Departments of Transportation and Motor Vehicles
- Insurance Departments
- Airports
- Planning Agencies
- Other regulators of new mobility services, including bike sharing, microtransit, pedicabs, technology platforms and car sharing.





IATR's Best Practices, Guiding Principles & Model Regulations

“Robotaxis:” Testing & Implementation of Shared-Connected-Automated-Electric For-Hire Vehicles (S-CAEVs)



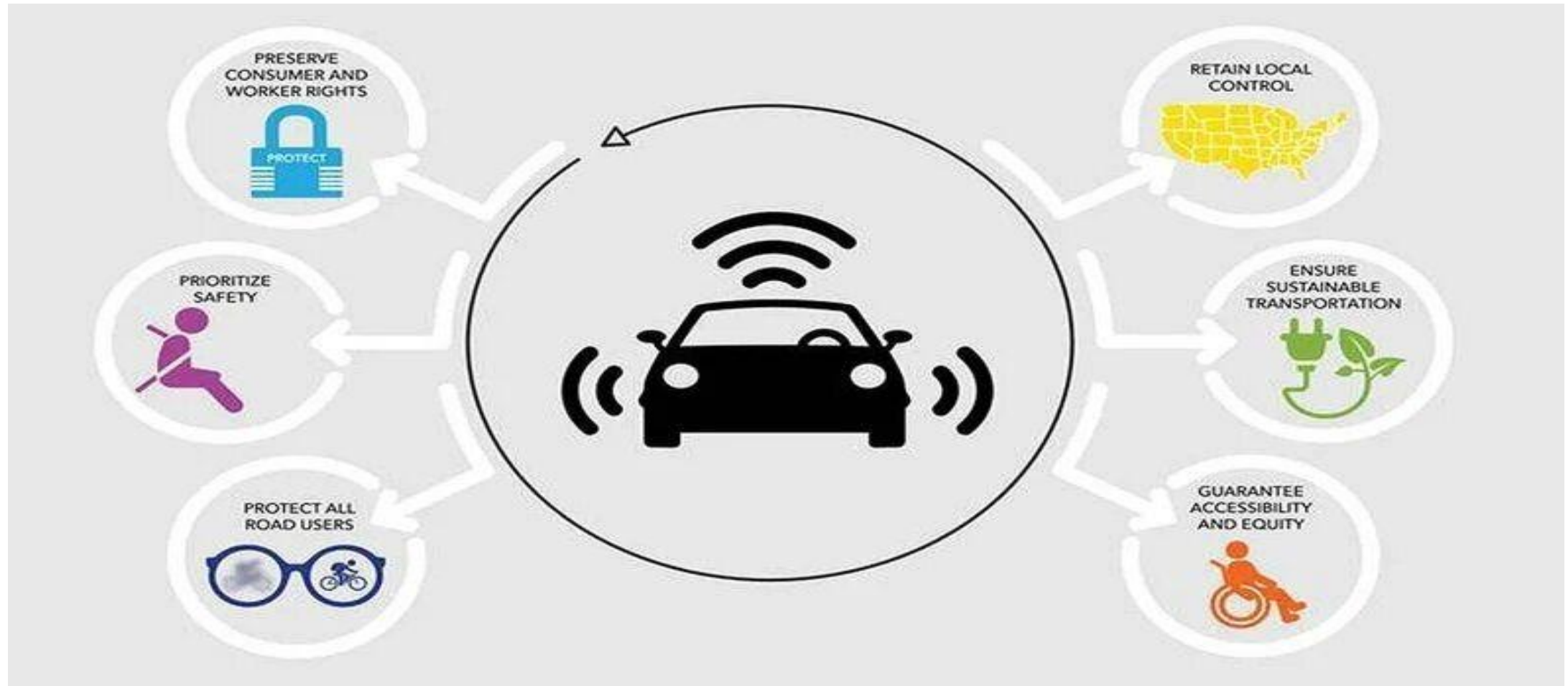
- To view the replay of IATR's December 2021 hearing on the model regulations, visit: <https://vimeo.com/659302180>
- To view the Guiding Principles for the Model Regulations, visit: <https://bit.ly/3zkdqiR>

IATR ROBOTAXI PROJECT - *PRIORITY POLICY TOPICS*

The model regulations, guiding principles and recommended best practices address the following topics:

1. **Safety and Vehicle Standards** 
2. **Equity and Accessibility** 
3. **Data Access and Privacy** 
4. **Labor Concerns and Workforce Development** 
5. **Governance, Business Models & Implementation** 

IATR GUIDING PRINCIPLES FOR ROBOTAXI IMPLEMENTATION



PRESERVE WORKER RIGHTS

- **Guiding Principle for Workforce Development & Minimizing Labor Displacement:** S-CAEV use in the taxi, for-hire vehicle, and TNC sectors should ensure that **employment opportunities are available for retraining drivers** to become testers or assume other roles, and that the removal of the physical driver from the vehicle is a phased process that ensures that **loss of property, earnings, and/or retirement benefits are minimized** (and that for taxi medallion systems, that such medallions be purchased or operated as an integral part of the system so that the **removal of the driver will lead to increased revenue for owners and drivers**).
- In the U.S., there are 337,867 taxi drivers ([2020](#))
- Average earnings: \$30,050 ([May 2021](#))
- Labor and financing costs are among the largest expenses for taxi operators.
- So, the taxi fleet owners may view the robotaxi as a means to immediately reduce expenses...



PRESERVE CONSUMER RIGHTS

- The current cost of operating a driverless robotaxi may not necessarily be cheaper by simply subtracting the labor cost from a traditional taxi operation. ***So, what will taxi fares be?***
- An MIT study found that even under the most optimistic scenario, a ***robotaxi would be about 2x the cost of a human-driven taxi: \$1.58 per mile vs. \$0.72 per mile.***
- What are the extra costs to operate robotaxis?
 - ***Equipment costs*** for motorized doors, sensors, computers, and backup systems (in the event of system failure).
 - Costs associated with ***licensing*** (like a taxicab medallion), remote operations, and insurance.
 - Low utilization rate (ratio of passenger miles over total miles traveled), at approximately 52% based on current taxi fleet.
- However, technology-related costs are expected to decrease over time.



PRIORITIZE SAFETY - PROTECT ALL ROAD USERS

- S-CAEVs must attempt to achieve *levels of safety that exceed current taxi, TNC and for-hire vehicle services*, and private industry should be permitted to test S-CAEVs with minimal and necessary government oversight at the **state or provincial level**, that should address insurance and liability, testing locations and reporting of incidents.
- S-CAEVs shall align with and *promote Vision Zero goals* and principles.



RISK, LIABILITY & INSURANCE – *ECONOMICALLY PROTECTING ALL ROAD USERS*

- Liability for S-CAEV crashes is a pressing issue that must be developed and finalized as part of a legal paradigm for both testing and full implementation. **Existing insurance business models and regulations will need to be revisited and municipal or government liability** (or sovereign immunity from lawsuits against the government) will need to be addressed.
- As a general rule, no victim of an S-CAEV crash should be without insurance or other form of redress for injuries sustained, and **government regulators and the industry should develop a uniform approach that may include victims' compensation funds or systems**, clear products liability statutes, and/or new forms of insurance that will assess and assign the risk appropriately, with responsibility resting primarily with the manufacturer and/or the operator.



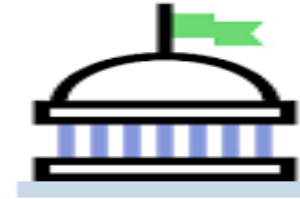
ENSURE SUSTAINABLE TRANSPORTATION

- **Guiding Principle:** S-CAEVs must improve environmental outcomes through the use of **zero-emission fleets and measures that increase vehicle efficiency and reduce or mitigate congestion** (including deadheading/zero-occupant vehicles), and **maximize the use of shared rides** (e.g., pooling).
- Companies pursuing autonomous vehicles such as Waymo and GM Cruise are considering utilizing EVs largely due to **lower operating costs for high-mileage autonomous vehicles**.
- In **California** – still by far the largest AV test bed in the world – roughly **81% of the AVs operating there in 2021 were either fully electric or plug-in hybrid**.
- On May 20, 2021, the California Air Resources Board (CARB) adopted a regulation to require electrification of ride-hailing companies starting in 2023, with annual targets requiring zero grams of CO₂ greenhouse gas emissions and 90% of passenger miles travelled to be fully electric by 2030.



GOVERNANCE – RETAIN LOCAL CONTROL WITH UNIFORM STANDARDS

- The **government must take a leadership role** in determining the framework and business service models for implementation, in conjunction with the above guiding principles and in consultation with private stakeholders, and to **consolidate and streamline decision-making among multiple government agencies**.
- Likewise, government and the private sector should work together closely to ensure that an S-CAEV paradigm is harmonized wherever possible, including a **common lexicon with definitions and industry standards**.
 - **The State of California:** *Autonomous technology: Technology, including a combination of hardware and software, remote and/or on-board, that has the capability to drive a vehicle without active physical control or monitoring by a human operator.*
 - **New York City:** *Autonomous vehicle technology: The term “autonomous vehicle technology” means the hardware and software that are collectively capable of performing part or all of the dynamic driving task on a sustained basis.*



GOVERNANCE

- **SAE International** defines levels of autonomy from Level 0 (no driving automation) to Level 5 (full driving automation) in the context of motor vehicles and their operation on roadways:
 - Level 0 – No Driving Automation.
 - Level 1 – Driver Assistance.
 - Level 2 – Partial Driving Automation.
 - Level 3 – Conditional Driving Automation.
 - Level 4 – High Driving Automation.
 - Level 5 – Full Driving Automation.

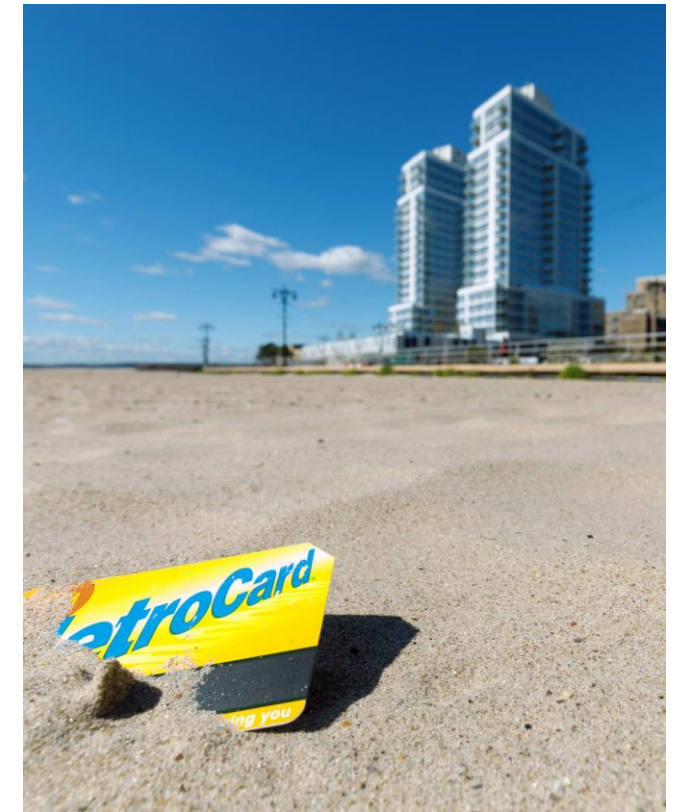
TRANSPORTATION PLANNING & ZONING (E.G., LOCAL CONTROL)

- Local jurisdictions or municipalities should develop a ***zoning or master plan*** that designates areas of operation and ensures passenger pick-up and drop-off in a manner consistent with congestion mitigation and other guiding principles and may include closing certain central business districts to only S-CAEVs and public transit.



GUARANTEE EQUITY

- **Equity:** S-CAEVs should provide equitable access for protected classes and other vulnerable populations, in terms of areas of service delivery, as well as affordable pricing or fares, with government subsidies and support if needed. **Implementation and testing of S-CAEVs should prioritize low-income and unbanked communities, and the development of any subsidy or business model should be explored** by participating jurisdictions.
- Underserved communities in transit deserts can be served by **first mile/last mile partnerships**. Electric AVs can be placed at charging stands in a two-fare zone – this would promote increased services to neighborhoods where they are deficient.
- **Will fares be lower than mass transit????**
 - The expected lower costs of robotaxis is one reason they will be key contributors to the global adoption of MaaS.
 - According to a 2021 report from *Ark Invest*, the market for MaaS will get even bigger in the 2030s, when robotaxi adoption is expected to really take off.
 - According to *Bloomberg*, the fleet of robotaxis is expected to grow 6,300% between 2030 and 2040, from 334,000 to 21.3 million.



GUARANTEE ACCESSIBILITY

- **Accessibility:** S-CAEVs must ensure that vehicles with wheelchair ramps are available and incorporated into both the testing and implementation phase, and that *consumers will have access to trained personnel to secure wheelchairs and accompany riders where requested and needed.* Public subsidies will be made available and prioritized for both public paratransit programs and private Non-Emergency-Medical Transport. *Access should be at the front of the testing and implementation paradigm, not an afterthought!*
- Ultimately, AV - WAVs could be used *exclusively with public transit.*
- **Labor impact?:** Few drivers right now want to preform this work, due to deadheading and high costs.
- **AV-WAVS – Are They a Thing Yet?:** Currently, autonomous ride-hail and shuttle startup **May Mobility** is partnering with wheelchair-accessible van manufacturer BraunAbility to modify its fleet of Toyota Sienna Autono-MaaS (S-AM) vehicles to include ADA-compliant vehicles.



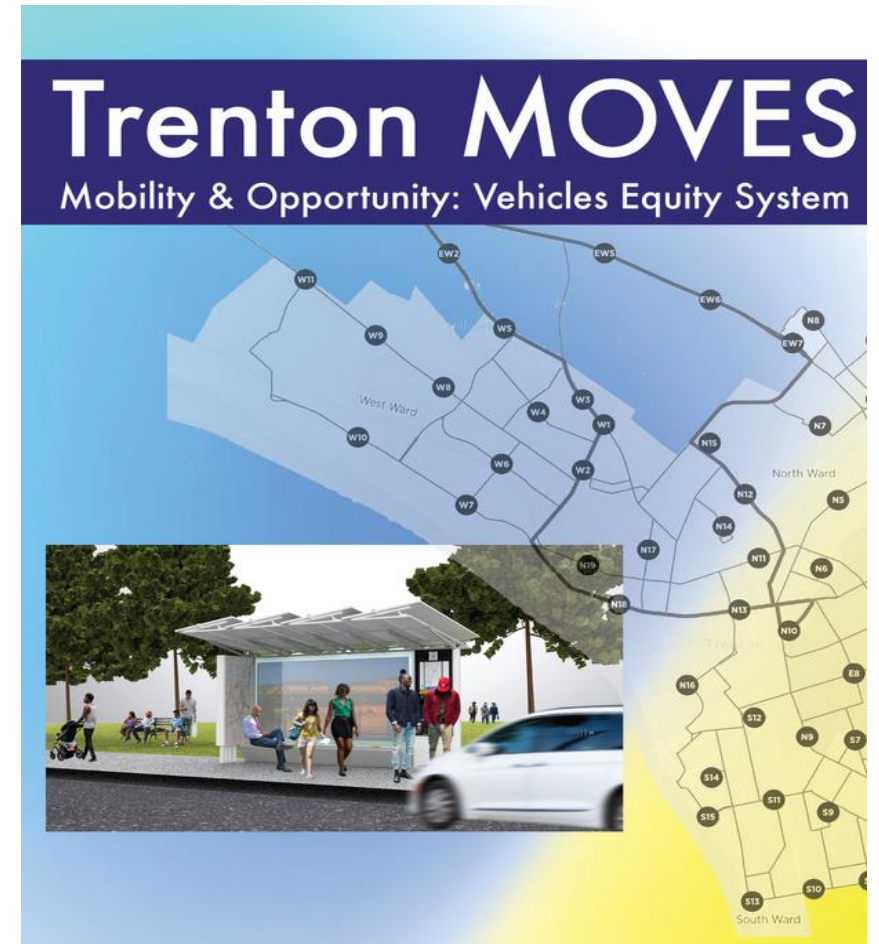
ROBOTAXI SERVICE & BUSINESS IMPLEMENTATION OPPORTUNITIES - BUSINESS MODELS & OPTIONS

- **Business models** for experimentation could include:
 - *procurement of S-CAEVs by public transit agencies*, or other government agencies, to run such vehicles as part of government fleets or as public transit systems;
 - mobility management companies or entities that will **incorporate S-CAEVs into a MaaS paradigm** with smartphone apps that can allow for connectivity on a single platform with public and private modes (including micro-mobility); and
 - **Innovative Public Private Partnerships** (e.g. Trenton MOVES)



TRENTON, NEW JERSEY - "TRENTON MOVES AV PROJECT"

- NJDOT Commissioner Diane Gutierrez-Scaccetti, Trenton Mayor Reed Guscior, and Trenton Public School District Superintendent James Earle jointly announced a \$5 million New Jersey Department of Transportation (NJDOT) Local Transportation Planning Fund Grant for **Trenton MOVES Autonomous Vehicle-Based Urban Transit System project**.
- On December 6, 2021, Governor Phil Murphy's office and the NJDOT initially announced a **Request for Expressions of Interest (RFEI)** for the Trenton Mobility & Opportunity: Vehicles Equity System (MOVES) Project.
- **Trenton MOVES will deploy 100 autonomous vehicles** throughout the state capital. The on-demand automated transit system will serve 90,000 residents of Trenton.
- Each of the vehicles in the network will carry **four to eight passengers** at a time, and the AVs will be low cost to users in underserved neighborhoods.
- During its initial launch, there will be in-vehicle attendants to demonstrate the safety and operational integrity of the service. Full deployment will occur after a detailed planning and testing phase.



THANK YOU!



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