



UCDAVIS

POLICY INSTITUTE FOR ENERGY, ENVIRONMENT, AND THE ECONOMY

ITS UCDAVIS

INSTITUTE OF TRANSPORTATION STUDIES

Top 10 Strategies for California Automated Vehicle Policy

Mollie Cohen D'Agostino and
Susan Shaheen, PhD

October 20, 2021



UNIVERSITY
OF
CALIFORNIA

Institute of
Transportation Studies



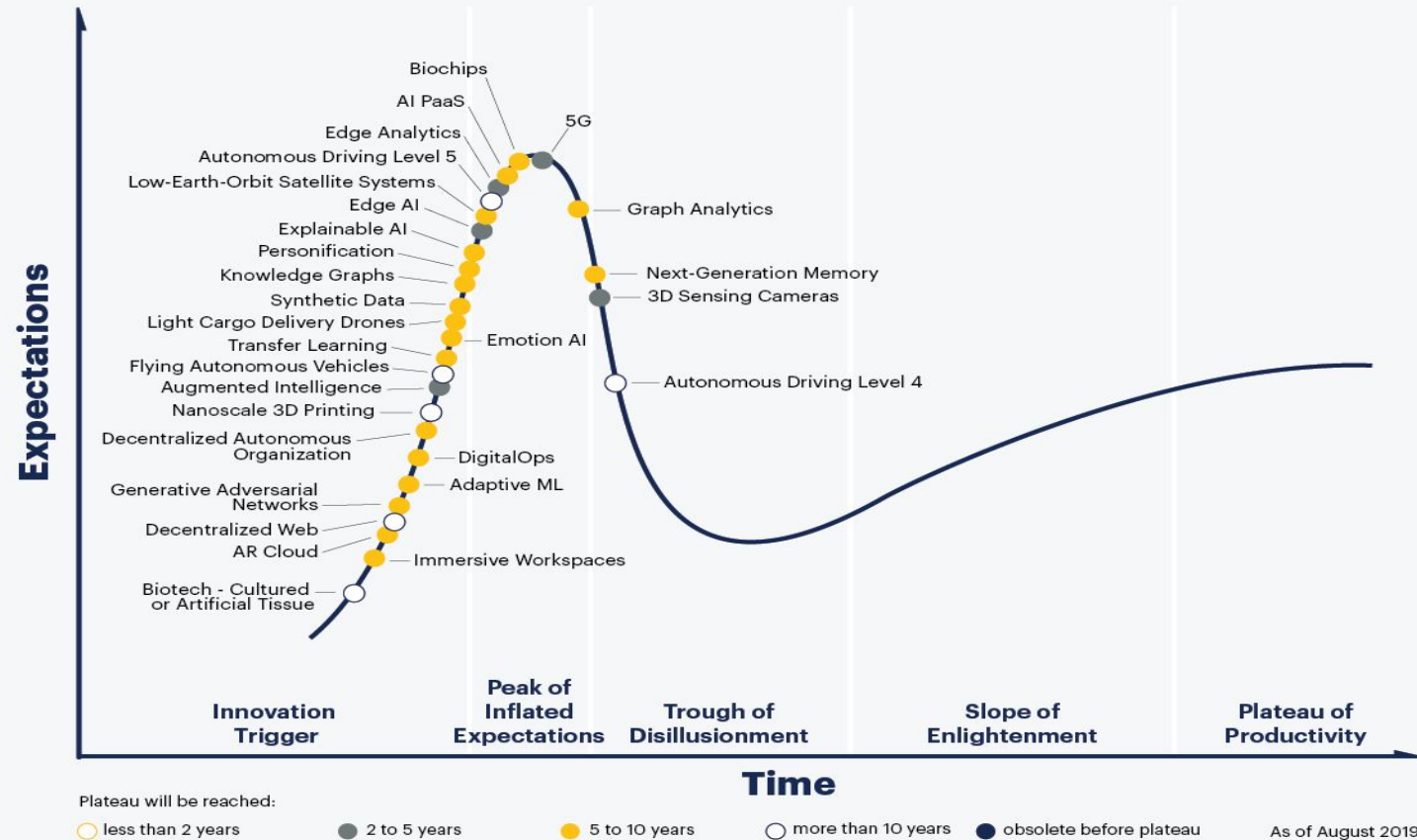
CSTACC

Climate Smart Transportation and
Communities Consortium

AV Hype Curve

- 2019 may have been the peak of hype curve
- There is a sentiment that AVs are now either in the “trough of disillusionment”
- Or nearing their productive phase

Gartner Hype Cycle for Emerging Technologies, 2019



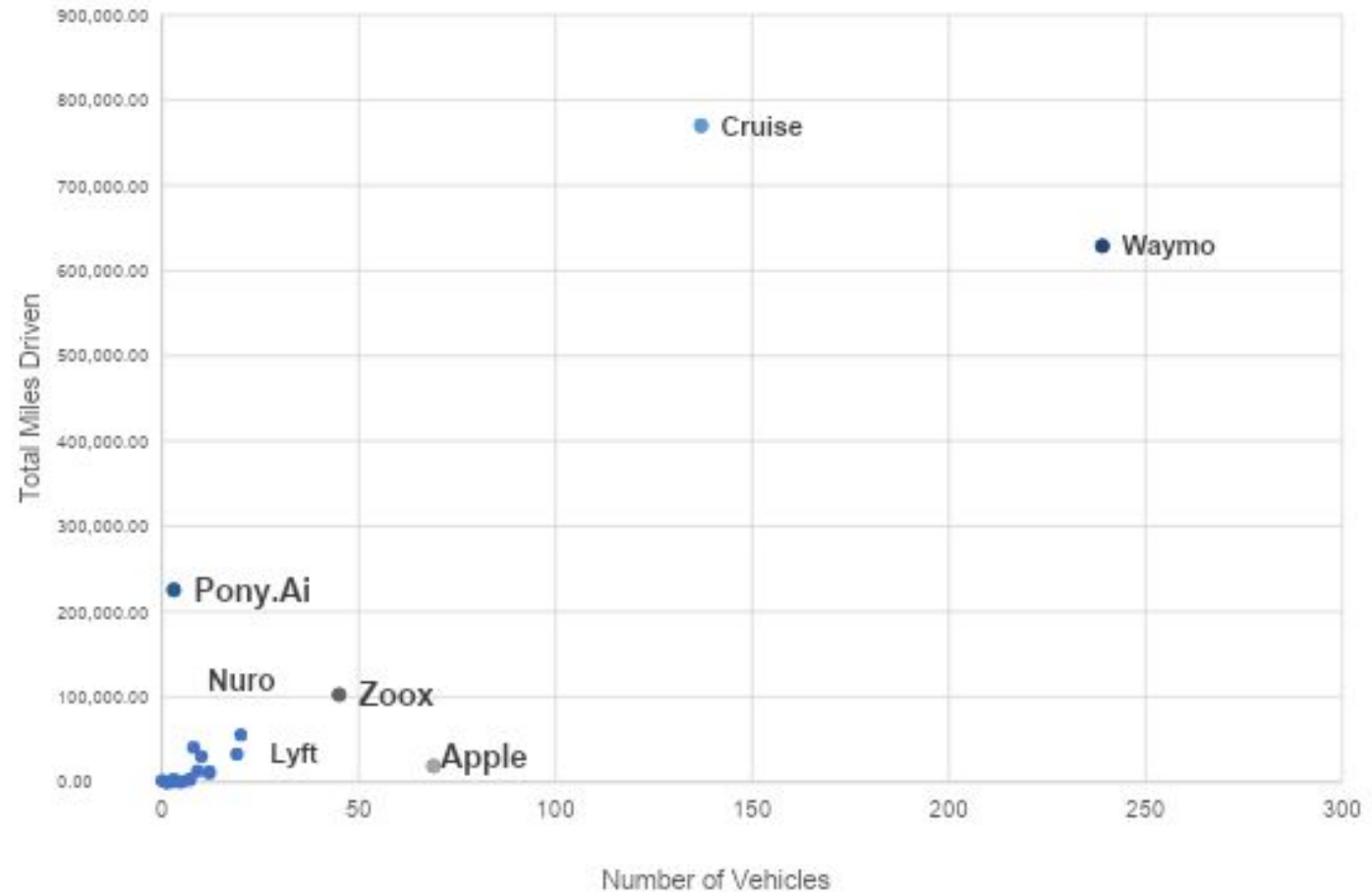
gartner.com/SmarterWithGartner

New Sector

DMV Deployment Permits Issued

- Nuro
- Cruise
- Waymo

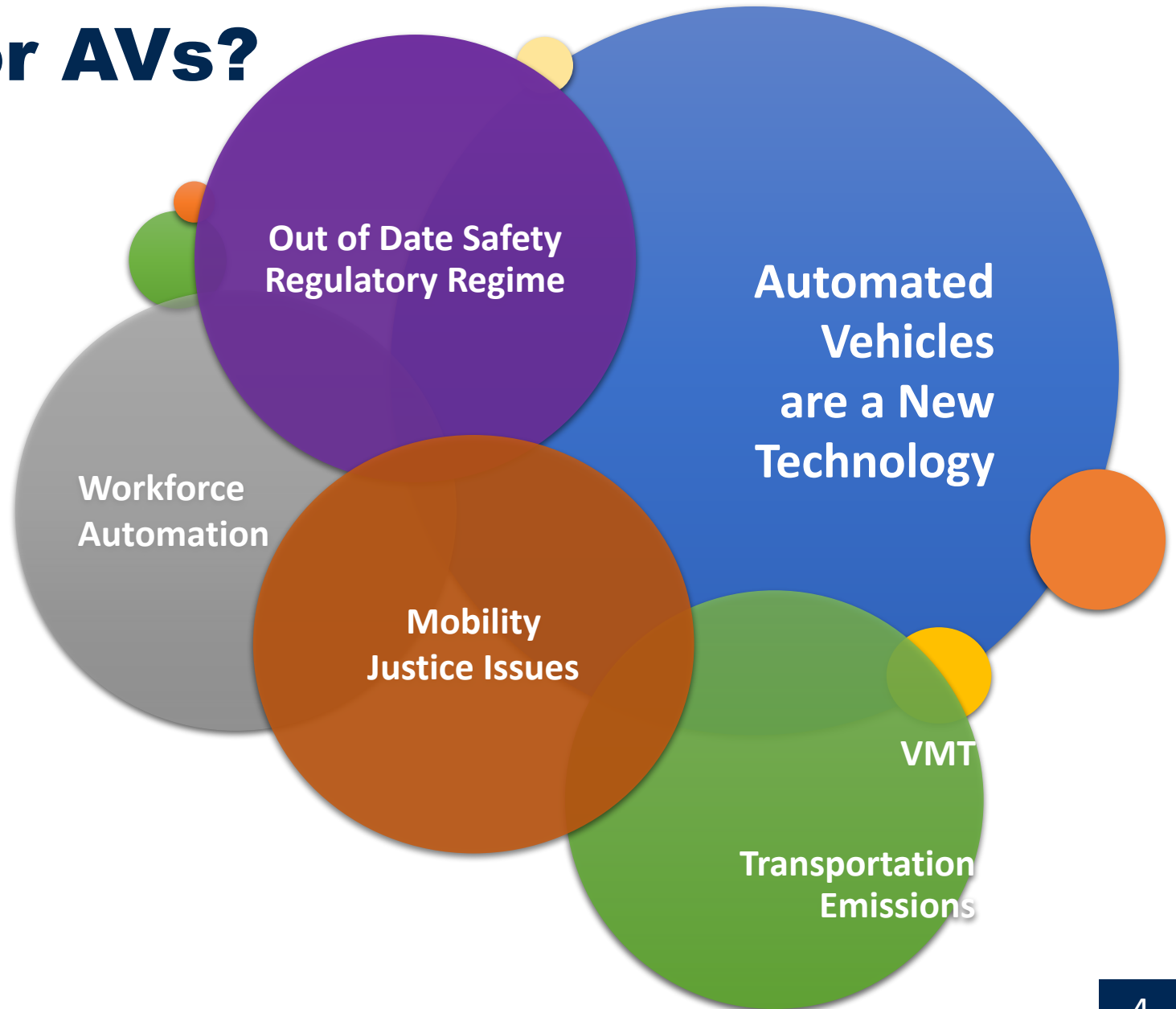
California DMV AV Testing Program 2020 mileage reporting vs. vehicle fleet



Data source: <https://www.dmv.ca.gov/portal/file/2020-autonomous-mileage-reports-csv>
Graphic D'Agostino (2021)

Have we solved for AVs?

- Figure shows known and unknown challenges for AVs.
- Little tangible policy actions to date on most of these topics.
- Strategic Growth Council Project tasked us with considering strategies for these problems



Key research question:

Q: What AV-related policies can fill gaps in existing state policy and advance key safety, equity, accessibility and sustainability priorities?

Top Ten Policy Strategies

(In order of the paper)

- 1. Ensure AVs Can Complement Public Transit Service**
- 2. Ensure AVs are Shared and Pooled.**
- 3. Ensure ZEV-AV adoption (SB 500 + SB 1014)**
- 4. Ensure Geographic Equity**
- 5. Ensure Safety**
- 6. Address Workforce Needs and improve Worker Safety Outcomes**
- 7. Ensure Open and Accessible Payment Options**
- 8. Ensure Disability Access**
- 9. Improve Data collection**
- 10. Evaluate Insurance and Liability**

Policy #1

Support AVs that are complementary to public transit.





Potential Policy Mechanisms

- 1a. Provide new grant opportunities for shared AV services that complement public transit
- 1b. Ensure transit agencies have spending flexibility in their capital and operating budgets to support transit-complementary AV services
- 1c. Require or incentivize AV passenger service companies to demonstrate that they operate an equitable share of service in disadvantaged communities to qualify for certain state permit programs or receive credits

First-Last Mile Connectors

- Dozens of AV shuttles operating worldwide today
- Low speed and higher speed options coming to market

Table 1. SAVs in Operation

Project Name	SAV Model & Manufacturer	Date Started and Location(s)	Route	Passenger Capacity
Waymo 	Chrysler Pacifica Hybrid mini-van	2017: Phoenix, AZ 2018: Cities in WA, CA, TX, MI, GA	Dynamic ride-hailing	7
ParkShuttle 	Connexion	2006: Rivium, Netherlands	Fixed (1800 meters)	22
CityMobil2, and other 	EasyMile EZ10	2014: Temporary pilots or ongoing deployments in 20 countries	Fixed	10 or 15
Olli 	Olli	2016: Chandler, AZ; Knoxville, TN; National Harbor, MD; Tempe, AZ	Fixed	8

[Sanguinetti, Kurani, Ferguson \(2019\)](#)

Policy #2

Discourage personal ownership of AVs and zero mile trips.

- 2a. Levy a registration fee for personally owned AVs.
- 2b. Levy a road user fee that charges privately owned AVs on a GHG-per-mile basis (with additional charges for empty miles) while ensuring user privacy.
- 2c. Establish a feebate to support more efficient modes of travel (e.g., public transit, biking, and walking), equitable access, and maintenance of public infrastructure.



AV Business Models

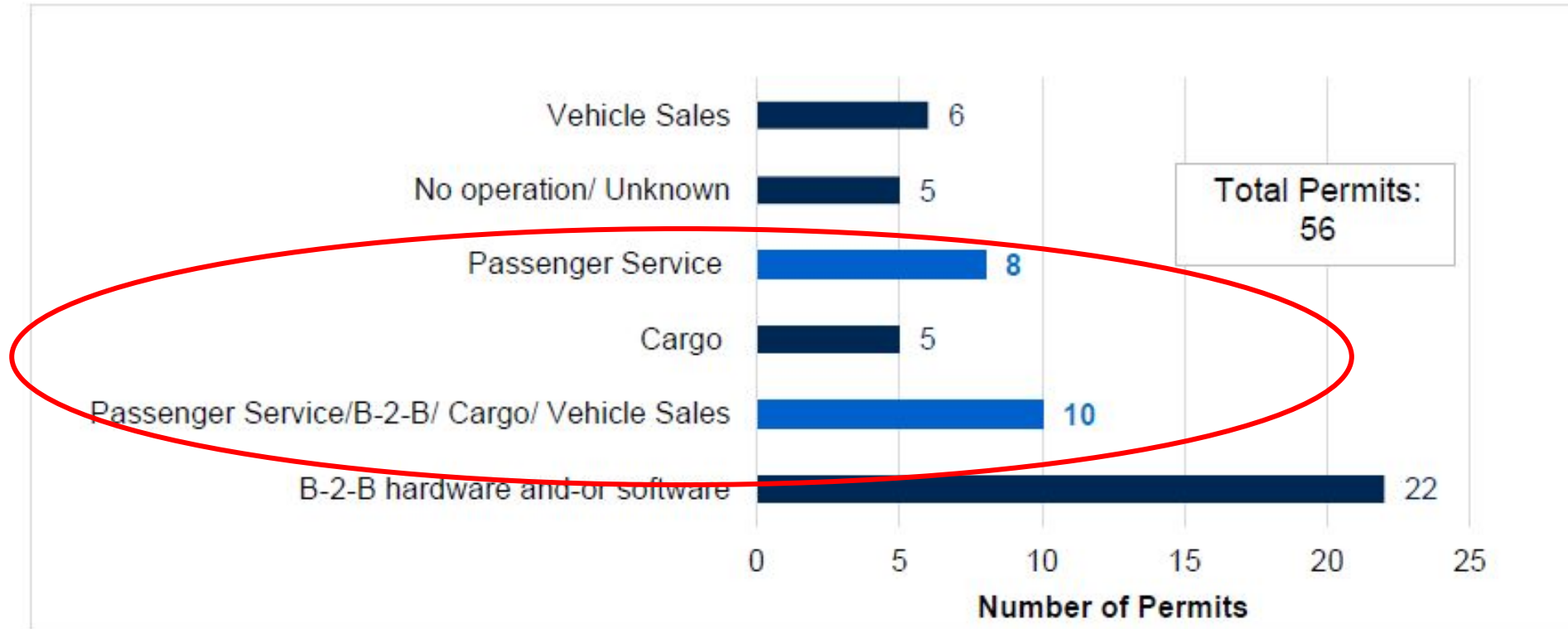


Figure 3. AV business models for companies with AV testing permits in California (as of March 2021)⁵⁷

Policy #3

Encourage AVs to be deployed as ZEVs.

- 3a. Establish supply-side incentives such as awarding extra ZEV credit to manufacturers for committing to AVs that are ZEVs.
- ✓ **3b. Mandate all AVs be rapidly electrified or incentivize such action.**
SB 500 requires that all AVs be ZEVs by 2030
- 3c. Invest in public charging infrastructure that meets the needs of AVs.



AV Electrification Plans

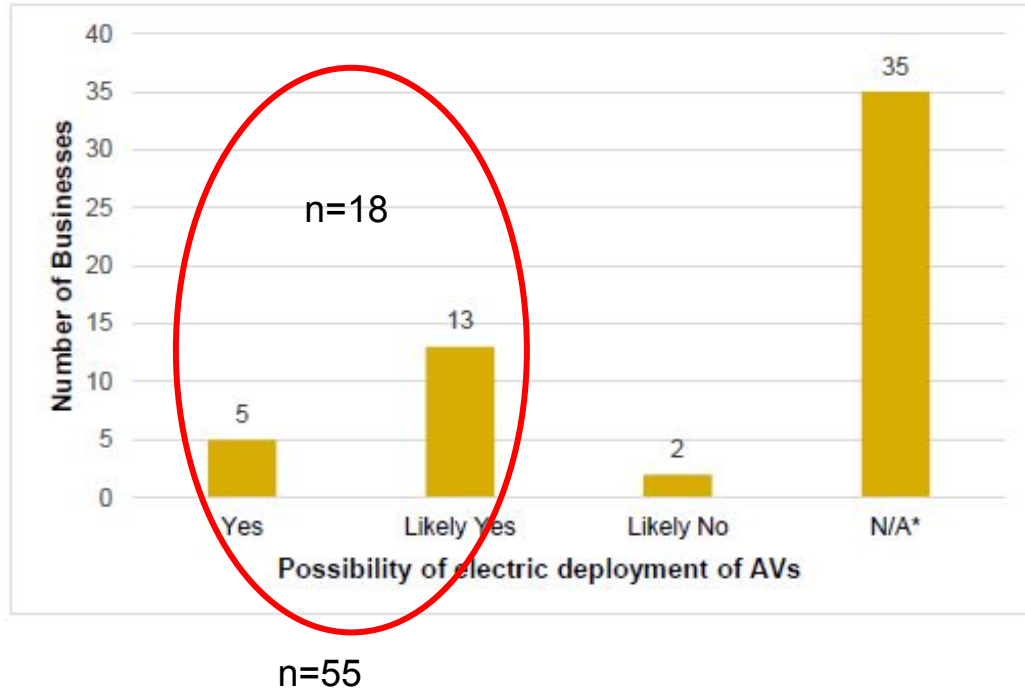


Figure 5. AV companies claiming to initially deploy with electric AVs among companies with AV testing permits in California (as of March 2021)

*B-2-B Software and Hardware Businesses

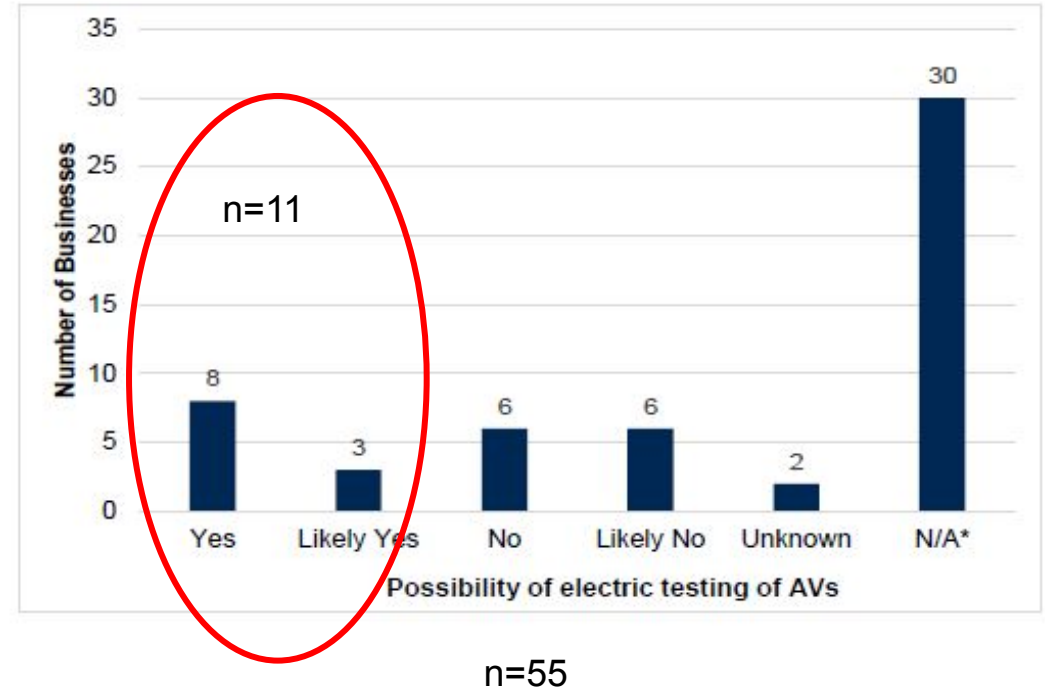


Figure 6. AV companies testing with electric AVs among companies with AV testing permits in California (as of March 2021)

*B-2-B Software and Hardware Businesses



Rural vs. Suburban vs. Urban

Policy #4

Encourage AV mobility service providers to provide service in rural and suburban areas, and especially in low-income or disadvantaged communities.

- 4a. Provide guidance for communities interested in AVs to conduct an equitable community needs assessment to ensure AV service is the *right choice* for their community and ensure *equitable and sustainable long-term outcomes*.
- 4b. Award state tax credits or direct subsidies to companies for meeting service goals for operating AVs in rural disadvantaged communities to expand mobility access or EV infrastructure availability for area residents.
- 4c. Mandate or incentivize minimum service thresholds for publicly funded AEV service in rural areas and rural disadvantaged communities.

Policy #5

Address safety both for passengers inside AVs and for pedestrians, bicyclists, and all people who will interact with AVs.

- 5a. Establish regulations that hold passenger service AVs to a set of safety and security performance measures and align data collection to outcomes.
- 5b. Establish regulations that hold AV cargo providers to a set of clear safety and security performance measures made for cargo AVs.
- 5c. Establish AV reporting requirements that encourage public accountability for AV-related safety incidents, and ensure there is no disparity in safety outcomes by race, income, or mode.

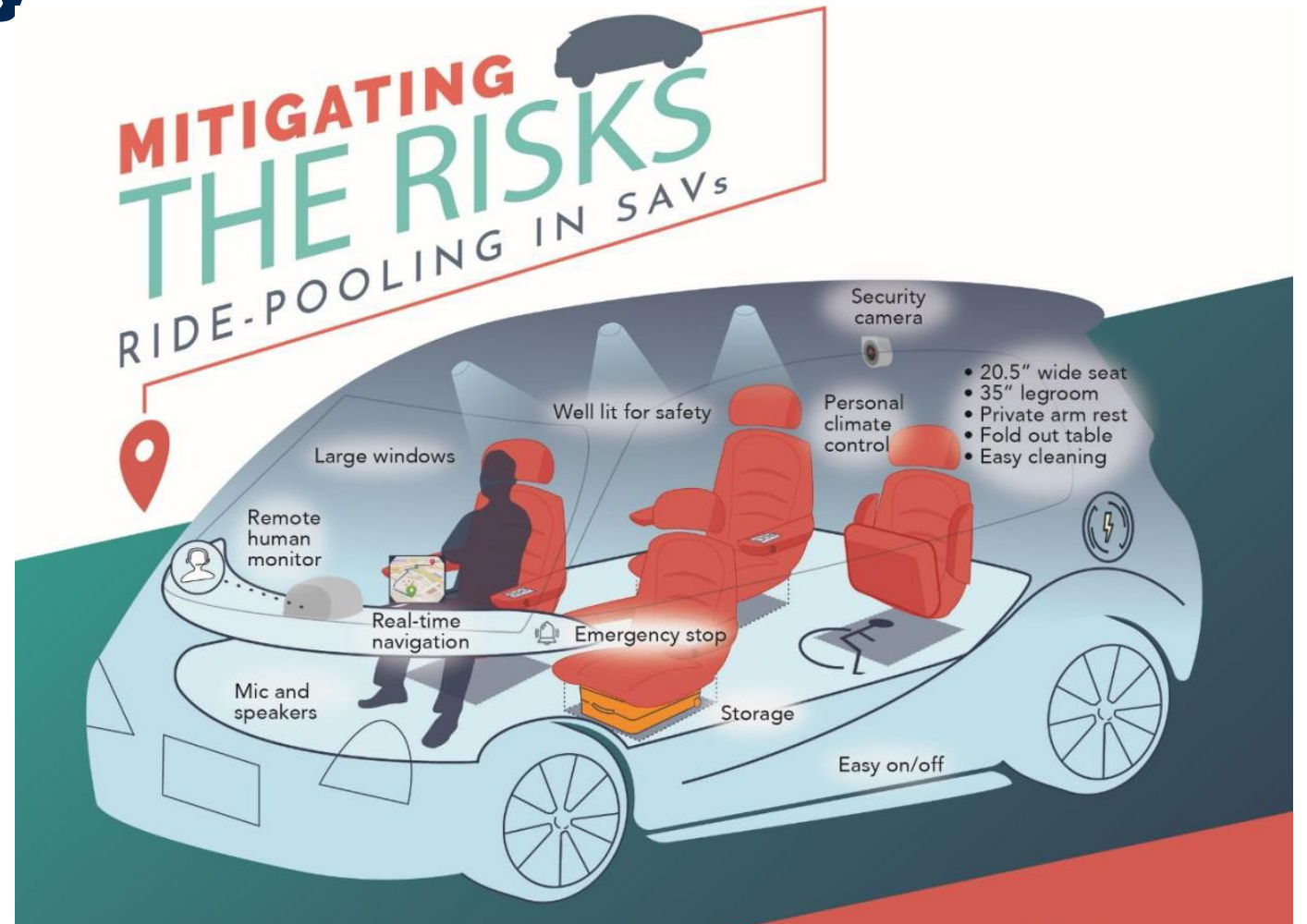
Safety & Security Definitions

Safety is protection from accidental harms.

Security is protection from intention harms.

CPUC includes Safety Reports for shared automated vehicles (SAVs) that operate in fleets.

AV-TNCs will submit a plan outlining how they intend to orient consumers to the technology, minimize risks, and respond to harassment or hostile individuals aboard.



[Sanguinetti, Kurani, Ferguson \(2019\)](#)

ERIC GUILLEN
ANSELMO ALDAY
LINDA HERNANDEZ
RAYMOND BAYQUEN

VOICES OF WORKERS

CRITERIA for GOOD WORK

JOB QUALITY MATTERS

- 1 LIVING WAGE
- 2 SAFE
- 3 BENEFITS
- 4 ACCESS TO TRAINING
- 5 POTENTIAL FOR WEALTH BUILDING
- 6 DIGNITY

DIGNITY AT WORK

BROADENING DEFINITION OF BUSINESS SUCCESS

IMAGINE a JOB QUALITY FUND THAT SUPPORTS ALL the CURRENT LOW WAGE WORKERS and ALLOWS WORKERS to ORGANIZE

WE NEED to CONSIDER UNBUNDLING BENEFITS and WORK

THIS IS ABOUT QUALITY of LIFE NOT JUST WORK

HOW COULD WE THINK ABOUT a PATH for YOUTH?



I AM an EMPOWERED WOMAN

LINDA

I ARRIVED in LA in 2001 and TOOK ANY JOB I COULD

I WORKED 10 YEARS at DISNEY



we're working to prevent workplace violence
SAY ENOUGH!

THEN WE WERE SOLD to a SUB-CONTRACTOR and LOST BENEFITS

OUR UNION HELPED PRESERVE SOME BENEFITS

DISNEY WASHED THEIR HANDS OF THE ISSUE OF WORKFORCE VIOLENCE and ASSAULT

NOT OUR PROBLEM!

I AM WORRIED ABOUT LOSING MY TPS STATUS
WE'RE ASKING the COMPANY to STOP the RAIDS

ANSELMO

MY COMPANY PROVIDES DEVELOPMENT THAT MAKES ME PROUD

WE OFFER a CAREER NOT JUST a JOB

it feels like a family

THEY KNOW ME and DEVELOP THEIR PEOPLE



ERIC

I WORKED at AMAZON FROM 2012-2016 in a WAREHOUSE

THEN I WORKED at MEDLINE WHERE WE WERE WATCHED WITH CAMERAS

I FELT LIKE a NUMBER

IT AFFECTED MY MENTAL HEALTH

* AI IS BEING USED FOR SURVEILLANCE

* IT WAS IMPOSSIBLE TO MAKE the RATES

I HURT MY BACK in 2015 at WORK



NOW I'M IN SCHOOL and SO MUCH HAPPIER

THEY SEE ME AS a PERSON

"we work to live"

THERE'S a NEGATIVE IMPRESSION of WAREHOUSES in MY COMMUNITY

RAYMOND

I HAD a CHILD WITH DEVELOPMENTAL NEEDS at 20

I STARTED AT CONFIRMED BIOSCIENCES

WAREHOUSE 6 YEARS

CULTURE MATTERS!
transparency matters

EDUCATION REIMBURSEMENT
ALWAYS GAVE THE BIG PICTURE
OFFERED PART OWNERSHIP FROM DAY 1

THEY OFFERED FLEXIBILITY and SUPPORT

VP of OPERATIONS

ENFORCE SAFE WORKSPACE LAWS

LOOK AT REGULATORY LAWS

CHANGING CORPORATE LAW in CA

THE HIGH ROAD to PROFITABILITY



HOW DO WE INCENT COMPANIES to DO BETTER??

HOW DO WE HELP THEM BE REWARDED FOR GOOD BEHAVIOR BY the MARKETS?

LOW COST CAPITAL FAVOR COMPANIES WITH PROCUREMENT WHO DO WELL

SUBSIDIES and TAX INCENTIVES

LICENSING HELP

CONSUMER PRESSURE



ADVICE FROM THE PANEL

- DON'T BE AFRAID, YOU HAVE RIGHTS
- GET OUT of YOUR COMFORT ZONE
- DO IT FOR YOUR COMMUNITY

VOICES OF WORKERS

- ## CRITERIA for GOOD WORK
- 1 LIVING WAGE
 - 2 SAFE
 - 3 BENEFITS
 - 4 ACCESS TO TRAINING
 - 5 POTENTIAL FOR WEALTH BUILDING
 - 6 DIGNITY
- ### JOB QUALITY MATTERS

RAYMOND

I HAD a CHILD WITH DEVELOPMENTAL NEEDS at 20

- * EDUCATION REIMBURSEMENT
- * ALWAYS GAVE THE BIG PICTURE
- * OFFERED PART OWNERSHIP FROM

ROAD to PROFITABILITY

DIGNITY AT WORK

BROADENING DEFINITION OF BUSINESS SUCCESS

Recommendations from California's Future of work commission

- **“Support workers in transition:** Technological change, public health crises, climate change, and other labor market impacts will require many workers to change occupations, build new skills, or relocate.
- **“Safely enable technology and protect workers in a data-driven future:** As new technologies are adopted in the workplace, workers will require adequate transparency and protection for collection of data in the workplace, benefits from the data they generate, and mitigation of algorithmic bias in areas like hiring and worker assessment.
- **“Build skills to prepare for jobs of the future:** Workers should be empowered with the skills to meet future needs in the labor market, including greater demand for critical thinking, collaboration, and creativity, in sectors from care work to climate mitigation to digital technology and beyond.

Policy #6

Establish workforce impact mitigation strategies associated with vehicle automation.

- 6a. Target retraining programs to future proof skills for drivers.
- 6b. Investigate how automation that can yield safety benefits for workers and community members.
- 6c. Target data collection strategies toward monitoring workforce safety and effects.
- 6d. Ensure a robust stakeholder engagement process includes drivers, so they can contribute their knowledge and expertise toward the transportation innovation sector.

Policy #7

Ensure AV booking and payment is open and accessible to all Californians.

- 7a. Require AV providers to use open-loop payment systems (meaning any payment method) and have an open application programming interface (open-API) that enables booking and payment interoperability with public transit service.
- 7b. Require that mobility providers offer alternatives to cash that meet community needs.
- 7c. Provide resources for transit and new mobility providers to offer online or telephone booking, as well as smartphone app-based multilingual booking.



<https://www.calitp.org/#about>

Wheelchair-Accessible Origin



Policy #8

Hasten adoption of AV passenger services for people with disabilities.

- 8a. Define key terminology as it relates to AVs, including the terms “accessibility,” “accessible AV service,” and “equivalent AV passenger service” and apply it across agency activities.
- 8b. Establish guidelines to directly connect parallel regulatory efforts aimed at encouraging more wheelchair-accessible service in TNCs with those instructing the AV Deployment Program.
- 8c. Fund community-owned enterprises or nonprofit organizations that can increase the availability of AV services for people with disabilities and determine specific priorities for passenger service operation.

Wheelchair Accessibility

Relevant Legal Activities

- **Independent Living Center San Francisco et. al. vs. Lyft Inc.**
 - Judge ruled Lyft is required to adhere to Title III of ADA
 - Judge failed to establish that there was a reasonable method for Lyft to respond to the specific demands of the plaintiff.
- **Equal Rights Center vs. Uber Technologies, Inc. et al.,**
 - No determination
- For future AV companies operating as microtransit or charter companies have less ambiguous standing (Title III will apply) but what becomes a reasonable accommodation may be up to courts to establish
- CPUC rulemaking in progress to support companies in transition

Policy #9

Align data collection across agencies to achieve public objectives.

- 9a. Establish data analysis protocols that complement existing and planned data collection strategies. By connecting data to concrete performance measures, the State can make effective use of the data that are being collected by DMV and CPUC.
- 9b. Establish or participate in a data clearinghouse to make better use of big data from AV service providers to inform state, regional, and local planning, while preserving privacy and limiting access.

Policy #10

Provide clear legislative direction that offers flexible options for covering risks and assigning liability.

- 10a. Establish more specific AV insurance minimums to appropriately match liability risks for AV fleets with different sizes and risk profiles (e.g., cybersecurity issues, algorithms, sensors, or infrastructure).
 - Currently DMV requires a cookie-cutter \$5 million coverage is required, or a surety bond.
- 10b. Identify liability insurance requirements for those who operate and use AVs (e.g., individual owners, fleet owners, TNCs).

Thank you

Mollie Cohen D'Agostino

3 Revolutions Policy Initiative

mdagostino@ucdavis.edu

Susan Shaheen, PhD

Director, California RIMI, UC ITS

Professor, CEE, UC Berkeley



CSTACC

Climate Smart Transportation and
Communities Consortium



**California
Resilient and Innovative
Mobility Initiative**

**UNIVERSITY
OF
CALIFORNIA**

Institute of
Transportation Studies