



# ADAS to Autonomy An Evolution In Progress

# Mobileye Past & Future

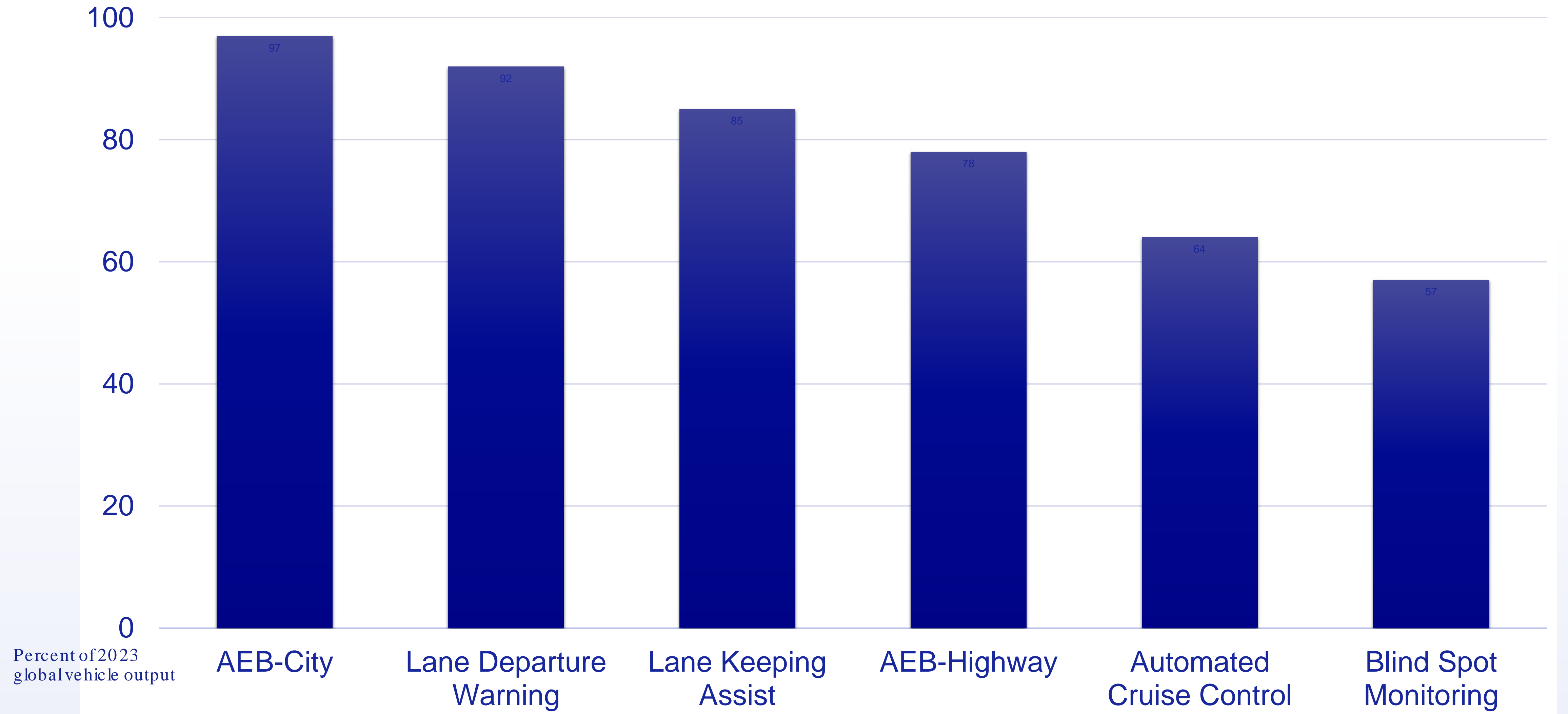
Some 25 years ago, Mobileye revolutionized driver-assist with a simple, but radical idea:  
A single, inexpensive camera sensor could be the basis for life-saving technology.



More than 170 million vehicles later, Mobileye continues to pioneer this driver-assist technology. Harnessing computer vision and AI to create solutions for the hardest problems facing the automotive and mobility sectors.



# ADAS Today



# Our Key Technology

Computer Vision



The EyeQ SoC Family



REMA Crowdsourced Mapping



RSS-Based Driving Policy

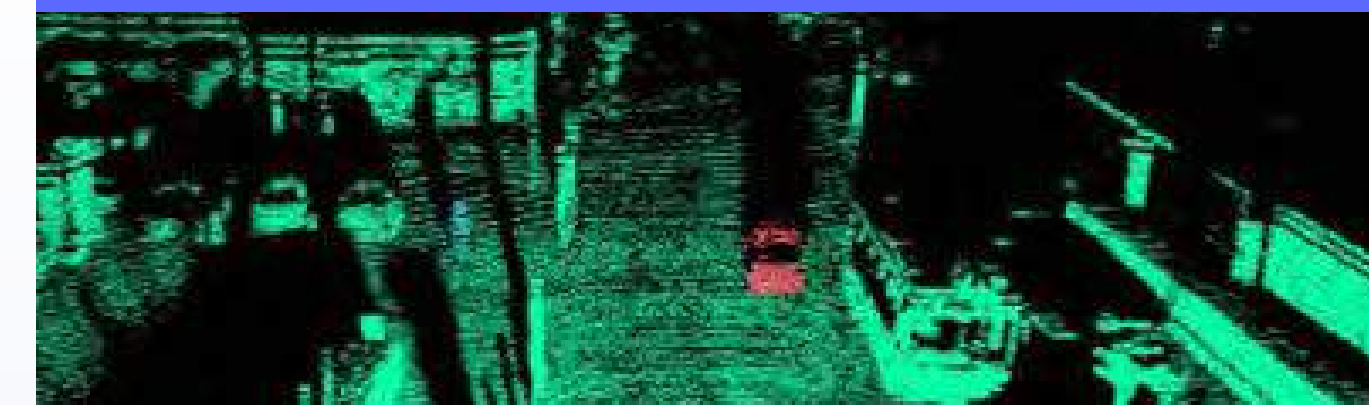
On a Formal Model of Safe and Scalable Self-driving Cars

$$P[e^m] = P[e_1^m \wedge e_2^m \wedge e_3^m] + \sum_{j=1}^3 P[e_j^m \wedge \neg e_1^m \wedge \neg e_2^m \wedge \neg e_3^m] + \sum_{j=1}^3 P[e_j^m \wedge \neg e_1^m \wedge e_2^m \wedge \neg e_3^m] + \sum_{j=1}^3 P[e_j^m \wedge e_1^m \wedge \neg e_2^m \wedge \neg e_3^m] + \sum_{j=1}^3 P[e_j^m \wedge e_1^m \wedge e_2^m \wedge \neg e_3^m] + \sum_{j=1}^3 P[e_j^m \wedge \neg e_1^m \wedge e_2^m \wedge e_3^m] + \sum_{j=1}^3 P[e_j^m \wedge e_1^m \wedge e_2^m \wedge e_3^m]$$

True Redundancy Sensing Architecture



Next-Gen Active Sensors



Scalable Architectures



# Computer Vision

Based on cameras, Mobileye's computer vision technology is the basis for everything we do – from driver-assist to autonomous vehicles.



20+ years of CV leadership



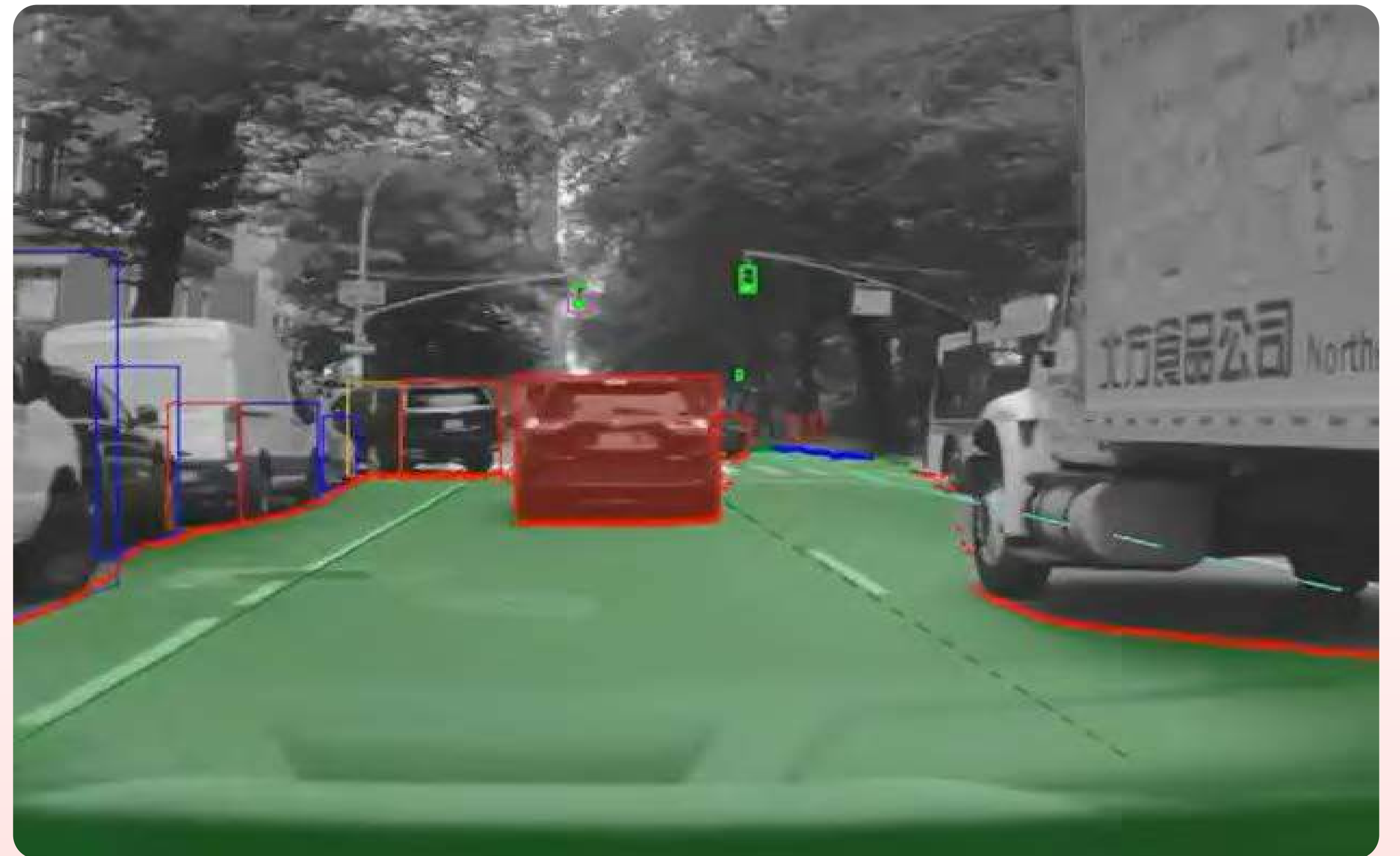
Comprehensive environment perception



Validated via multiple OEM deployments



Validated in 200PB+ of worldwide data



# EyeQÅ Family of Purpose-Built SoCs

The EyeQÅ chip is the 'brain' behind all of Mobileye's technologies.



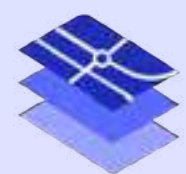
Scalable architecture covering the entire spectrum of AV / ADAS solutions



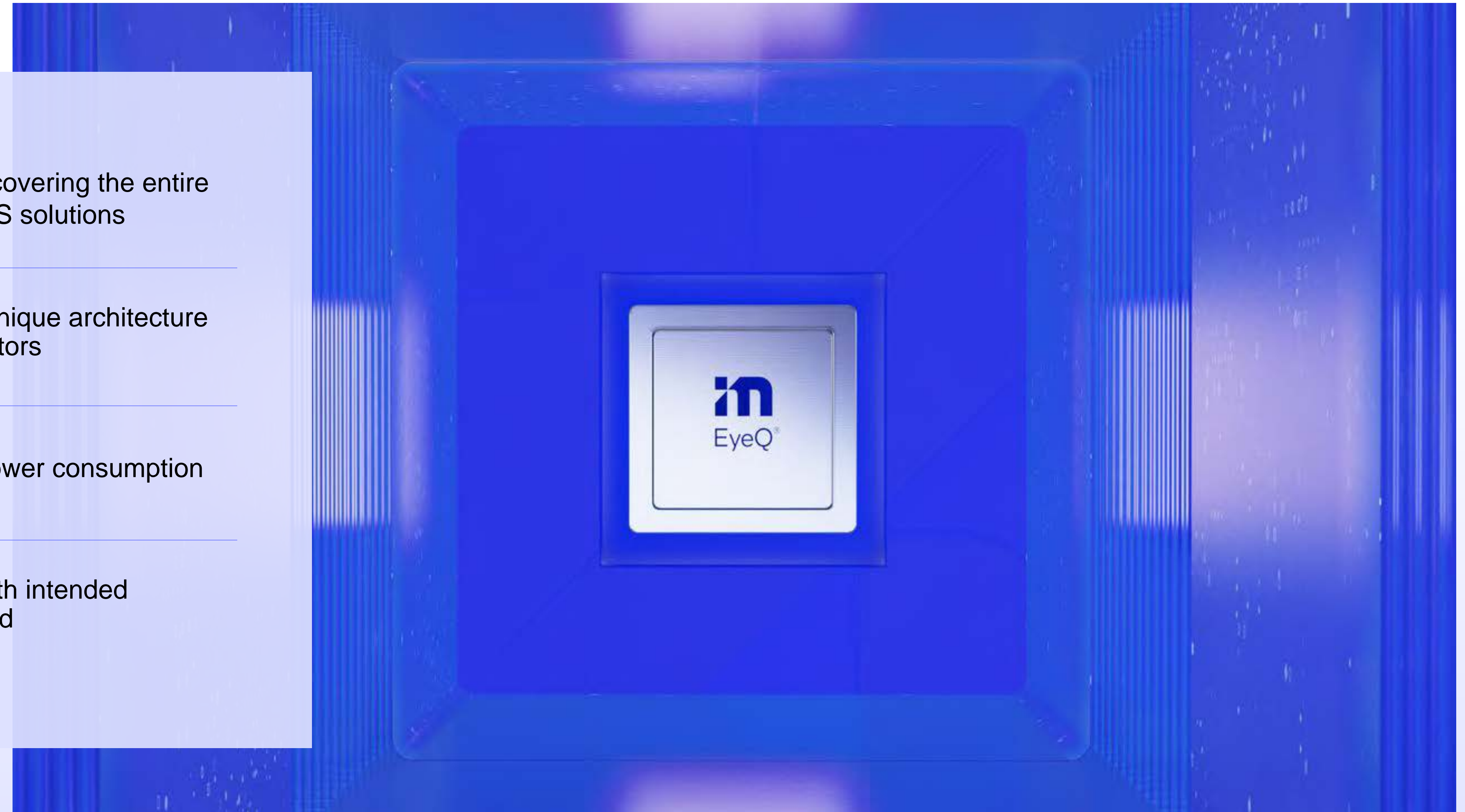
Efficiency through a unique architecture of diversified accelerators



Superior cost & low power consumption

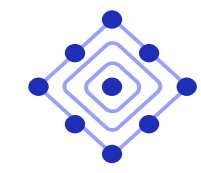


Internally designed with intended software needs in mind



# REMA Mapping

Mobileye's crowdsourced, highly precise, continuously updated map of the worldwide driving environment



## Scalability

Unlocks millions of "mapping agents" in every relevant region



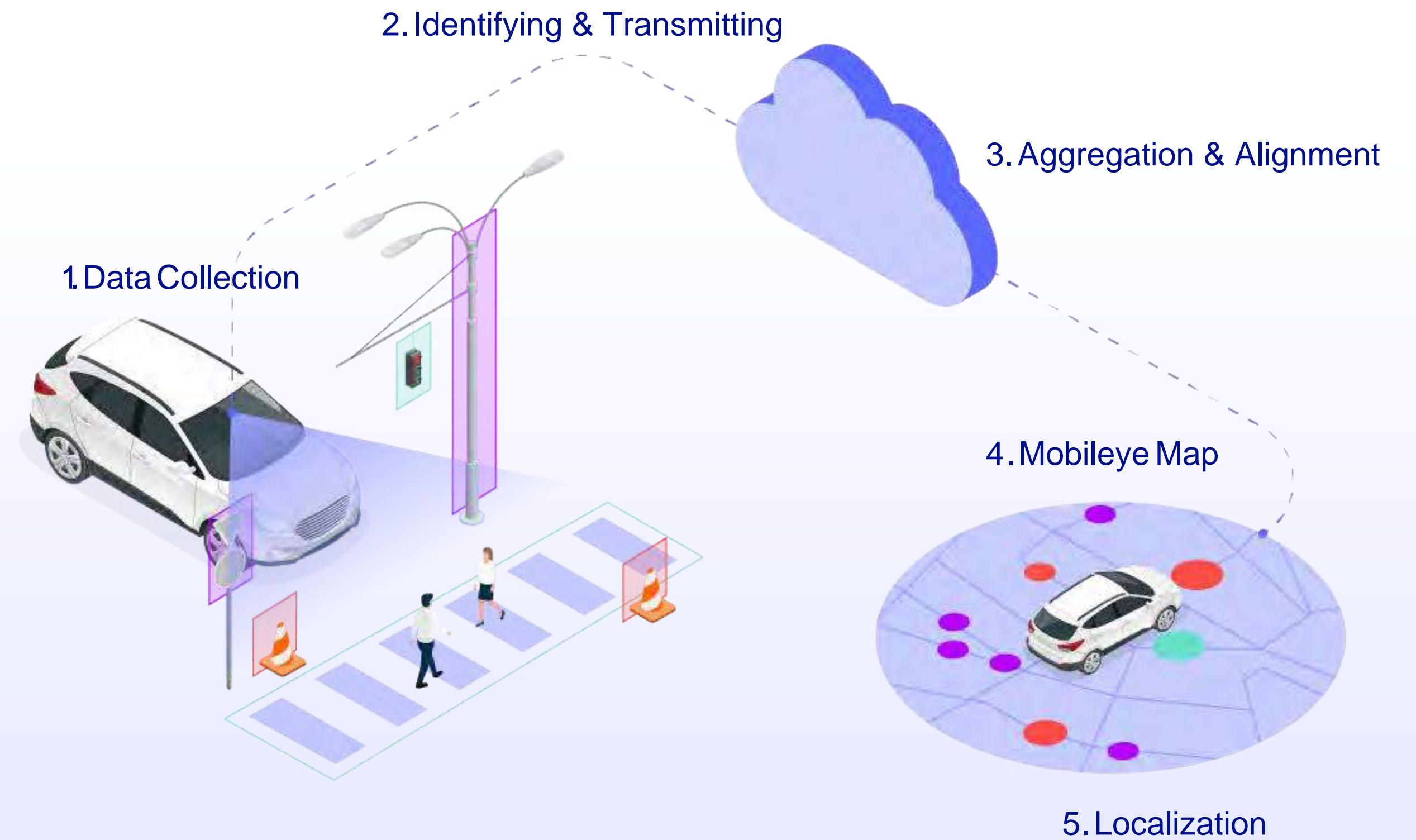
## Accuracy

Uses novel state-of-the-art algorithms to achieve high accuracy levels where it matters



## Detailed Semantic Features

Uses explicit attributes and crowdsourced data to generalize traffic rules and driving culture



# REMA Global Coverage

12.B

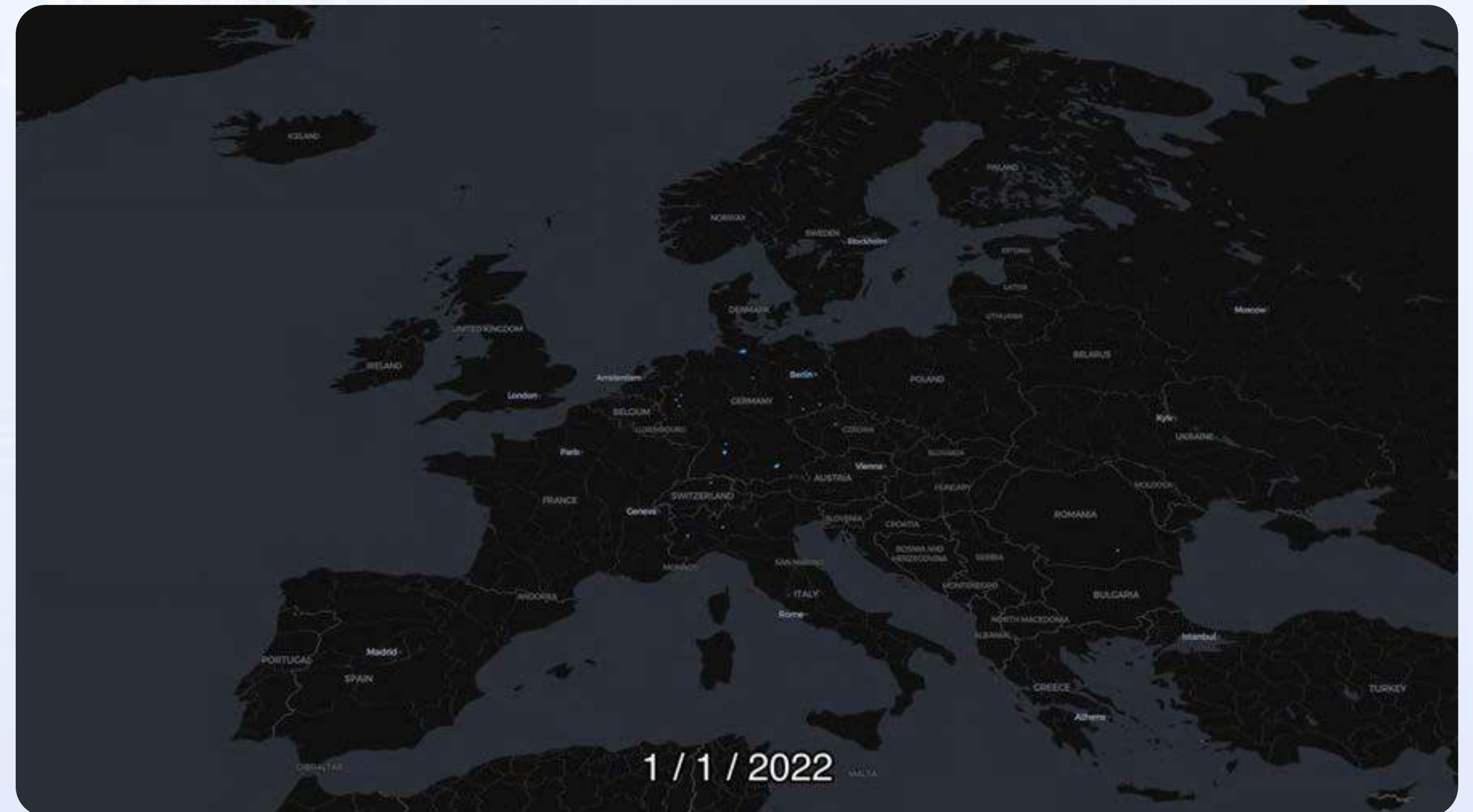
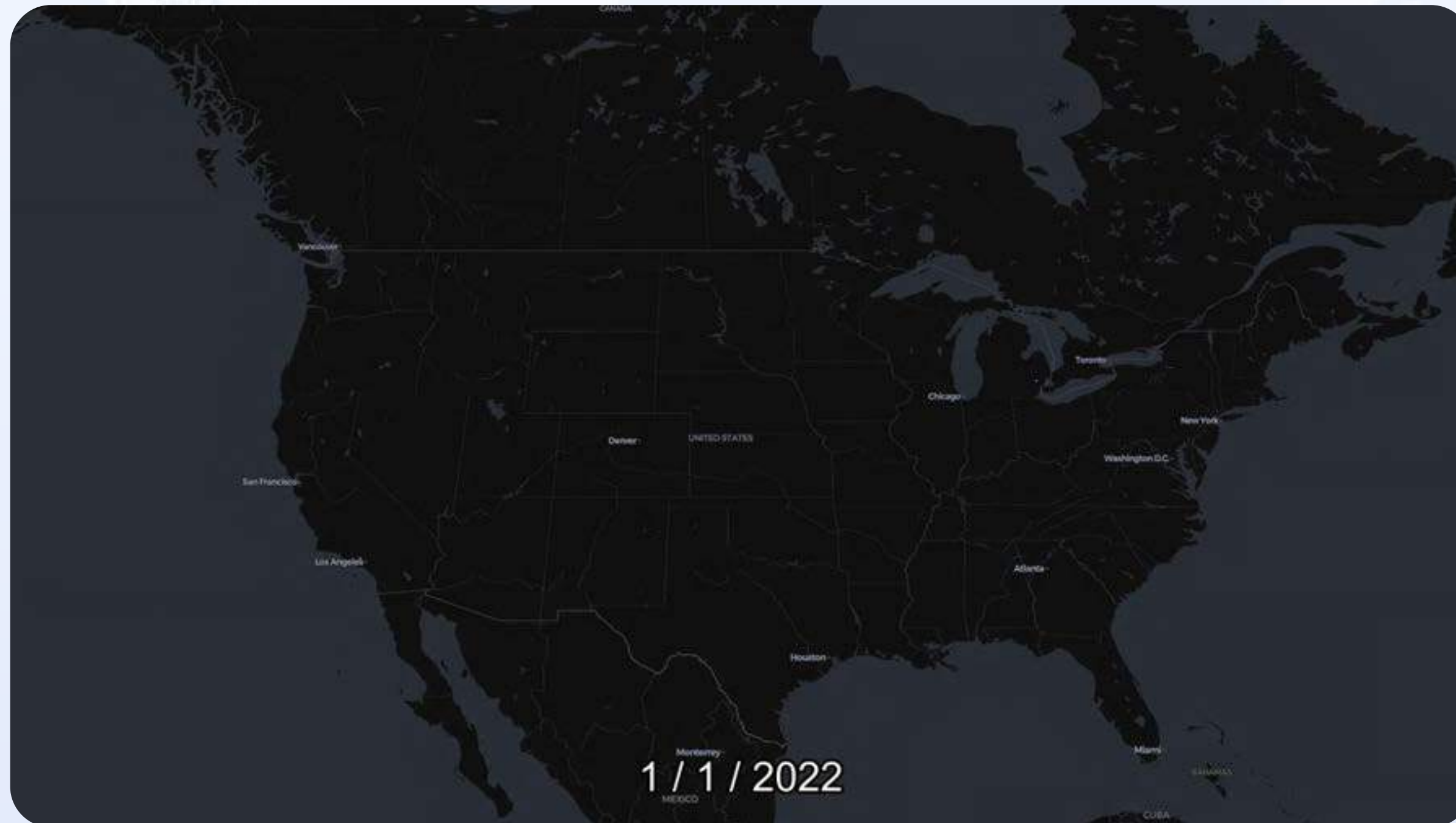
Total miles harvested so far

8.6B

Miles harvested in 2022

29M

Miles collected daily





# RSS Å-Based Driving Policy

A formal model for safety, formalizing the human common sense of balancing safety with usefulness

## On a Formal Model of Safe and Scalable Self-driving Cars

Shai Shalev-Shwartz, Shaked Shammah, Amnon Shashua

Mobileye, 2017

### Abstract

In recent years, car makers and tech companies have been racing towards self driving cars. It seems that the main parameter in this race is who will have the first car on the road. The goal of this paper is to add to the equation two additional crucial parameters. The first is standardization of safety assurance — what are the minimal requirements that every self-driving car must satisfy, and how can we verify these requirements. The second parameter is scalability — engineering solutions that lead to unleashed costs will not scale to millions of cars, which will push interest in this field into a niche academic corner, and drive the entire field into a “winter of autonomous driving”. In the first part of the paper we propose a white-box, interpretable, mathematical model for safety assurance, which we call Responsibility-Sensitive Safety (RSS). In the second part we describe a design of a system that adheres to our safety assurance requirements and is scalable to millions of cars.

Mobileye has proposed a technology-neutral, mathematical safety model to help define what it means for an automated vehicle to drive safely. Composed of formal logic and rules, our model – called Responsibility-Sensitive Safety (RSS) – adheres to five safety rules:

- 1 Safe Distance – Don't hit the car in front of you.
- 2 Cutting In – Don't cut in recklessly.
- 3 Right of Way – The right of way is given, not taken.
- 4 Limited Visibility – Be cautious in areas with limited visibility.
- 5 Avoid Crashes – If you can avoid a crash without causing another one, you must.

# Mobileye's Active Sensors

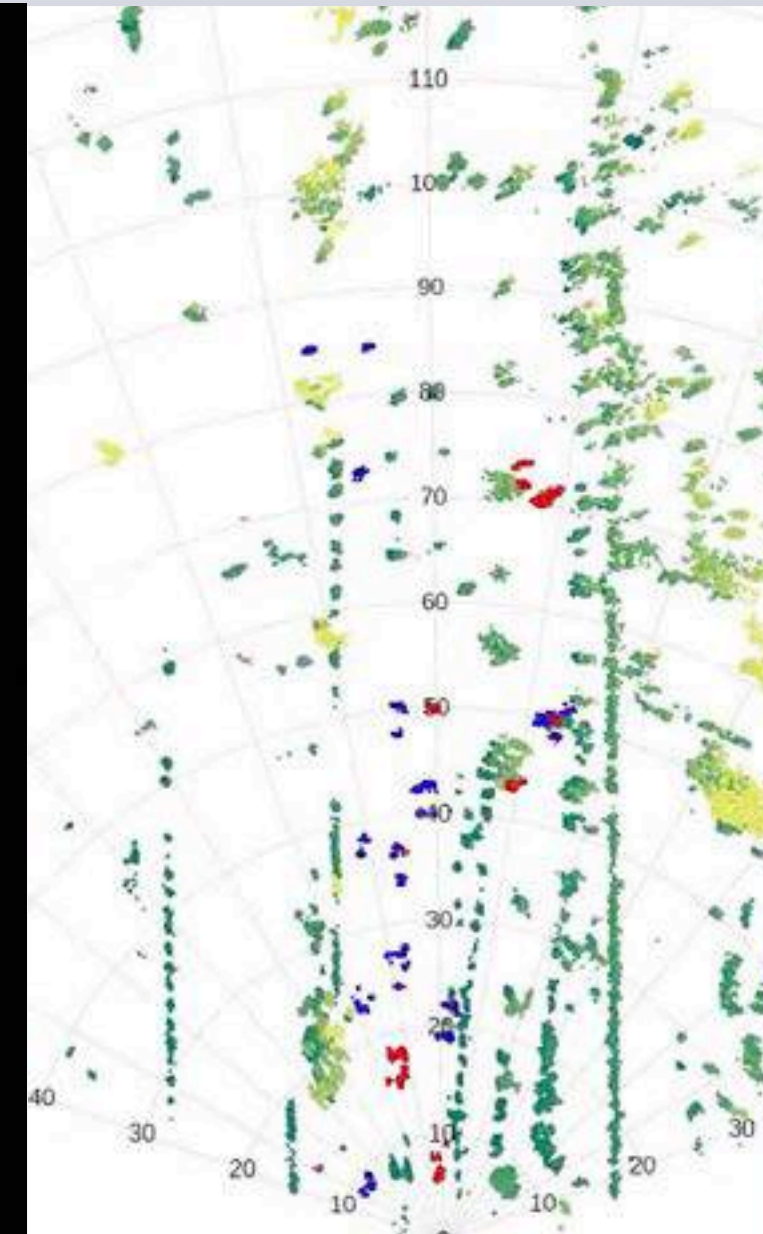
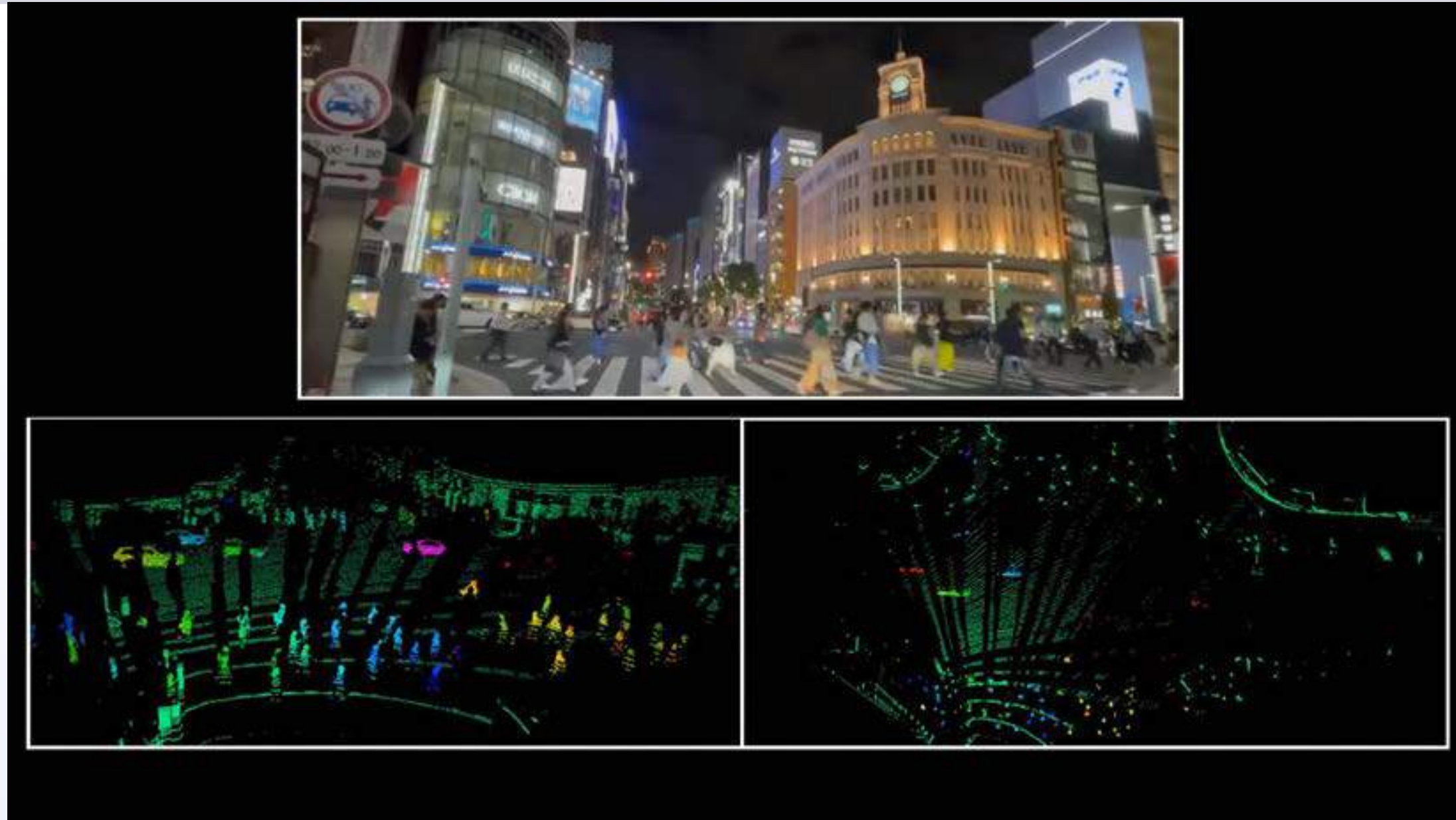
Next generation lidar and radar sensors, developed by Mobileye to help power hands-off/eyes-off driving solutions



Frequency Modulated Continuous Wave Lidar



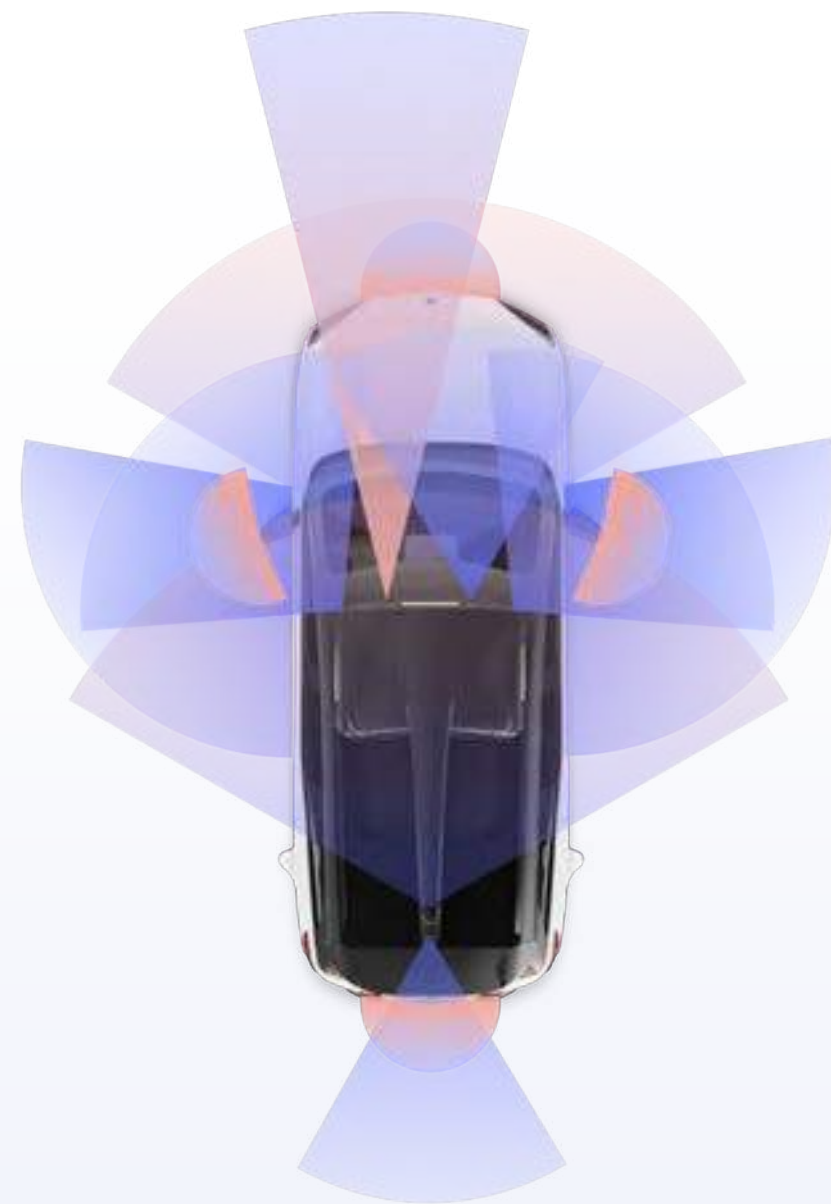
Software-Defined Imaging Radar



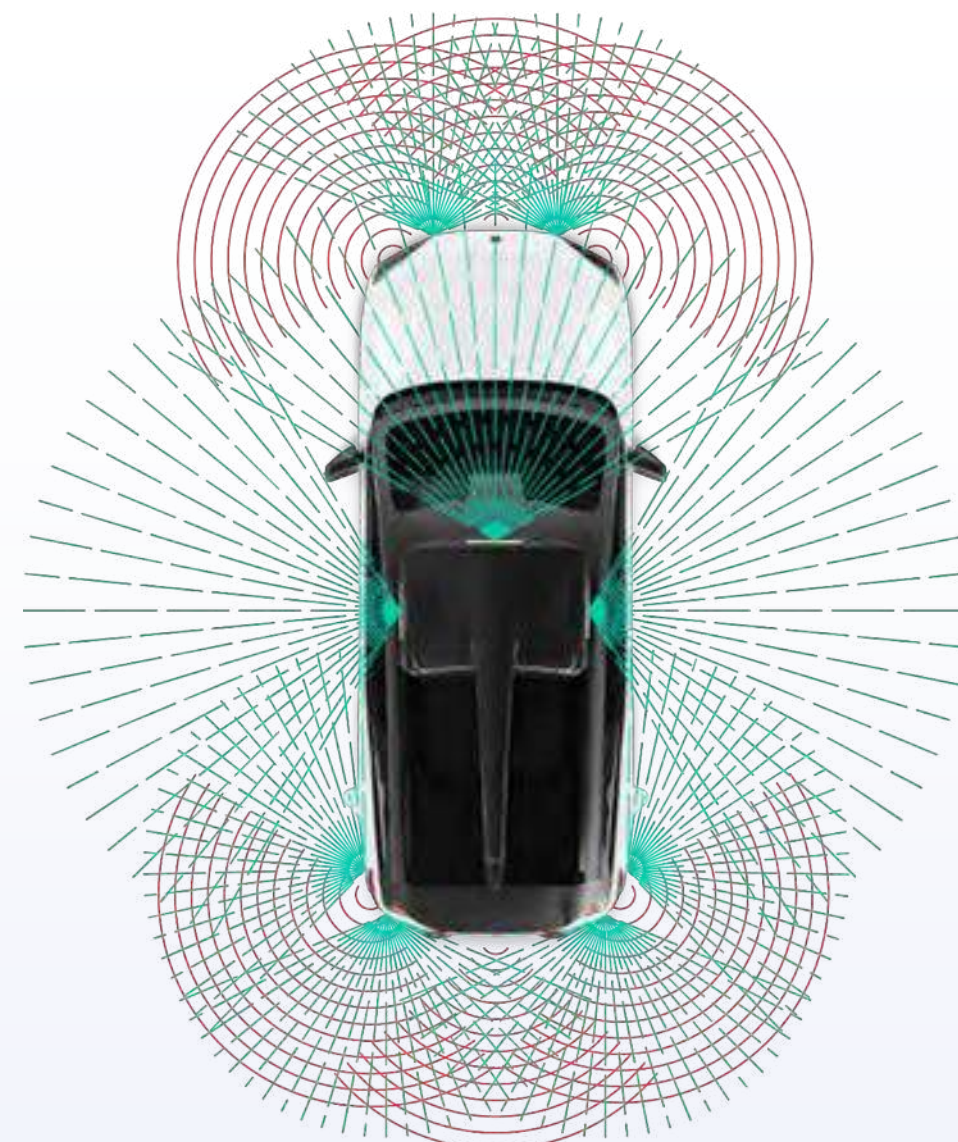
# True Redundancy<sup>Å</sup>

A unique approach whereby two independent subsystems serve as backups to each other, providing enhanced safety for hands-off/eyes-off driving solutions. Not merely redundancy, but True Redundancy<sup>Å</sup>

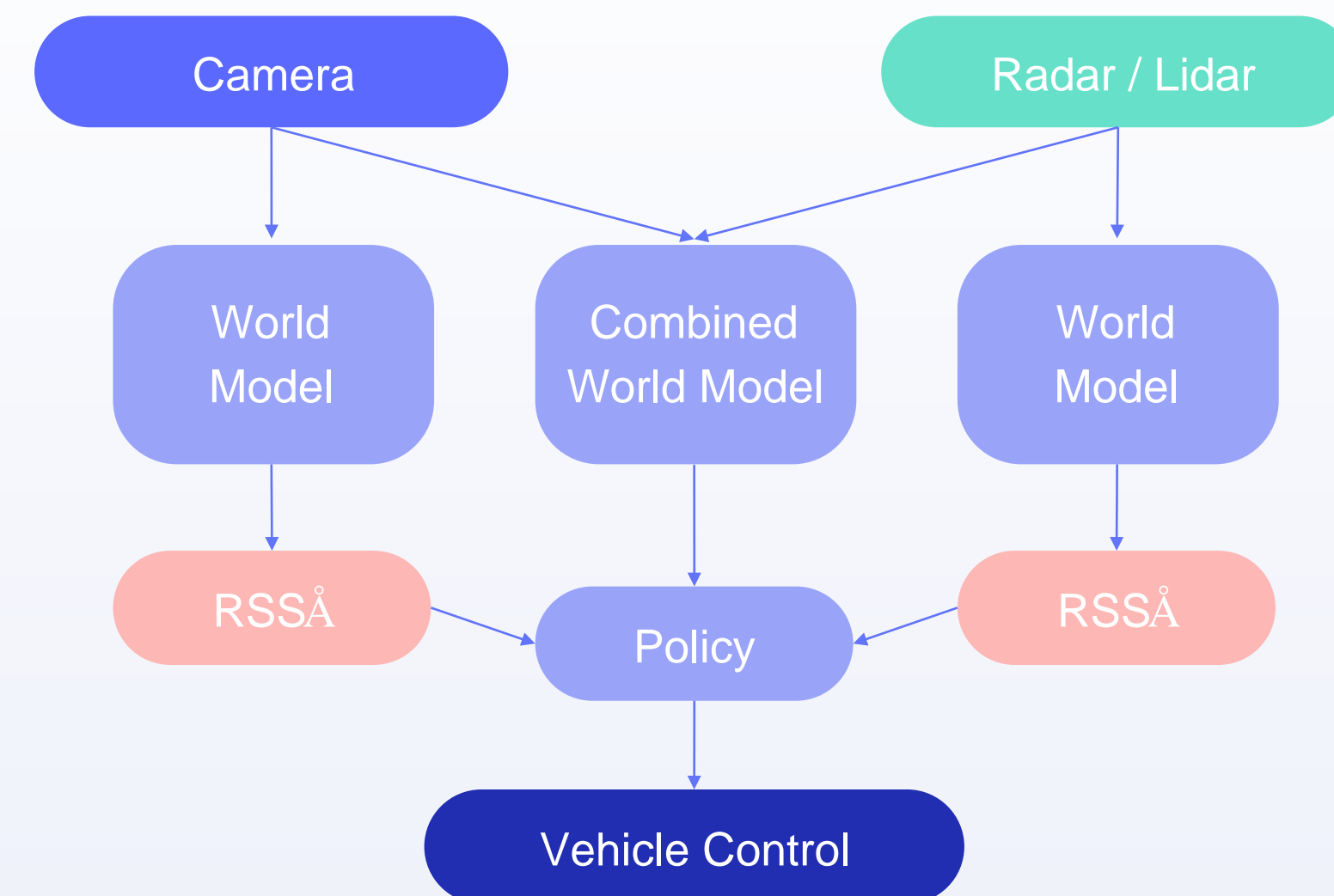
Two separate perception systems:



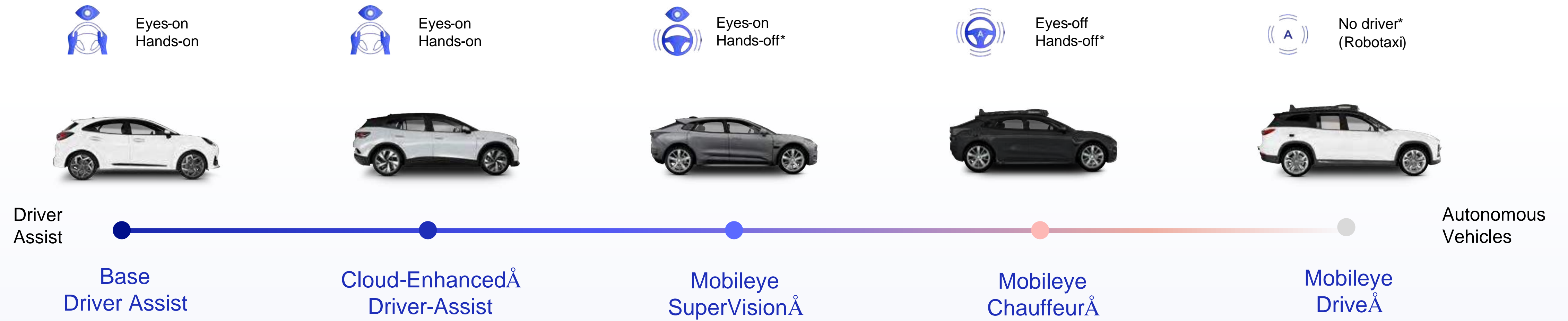
Primary subsystem  
cameras alone



Secondary subsystem  
radar/lidar alone



# Product Portfolio



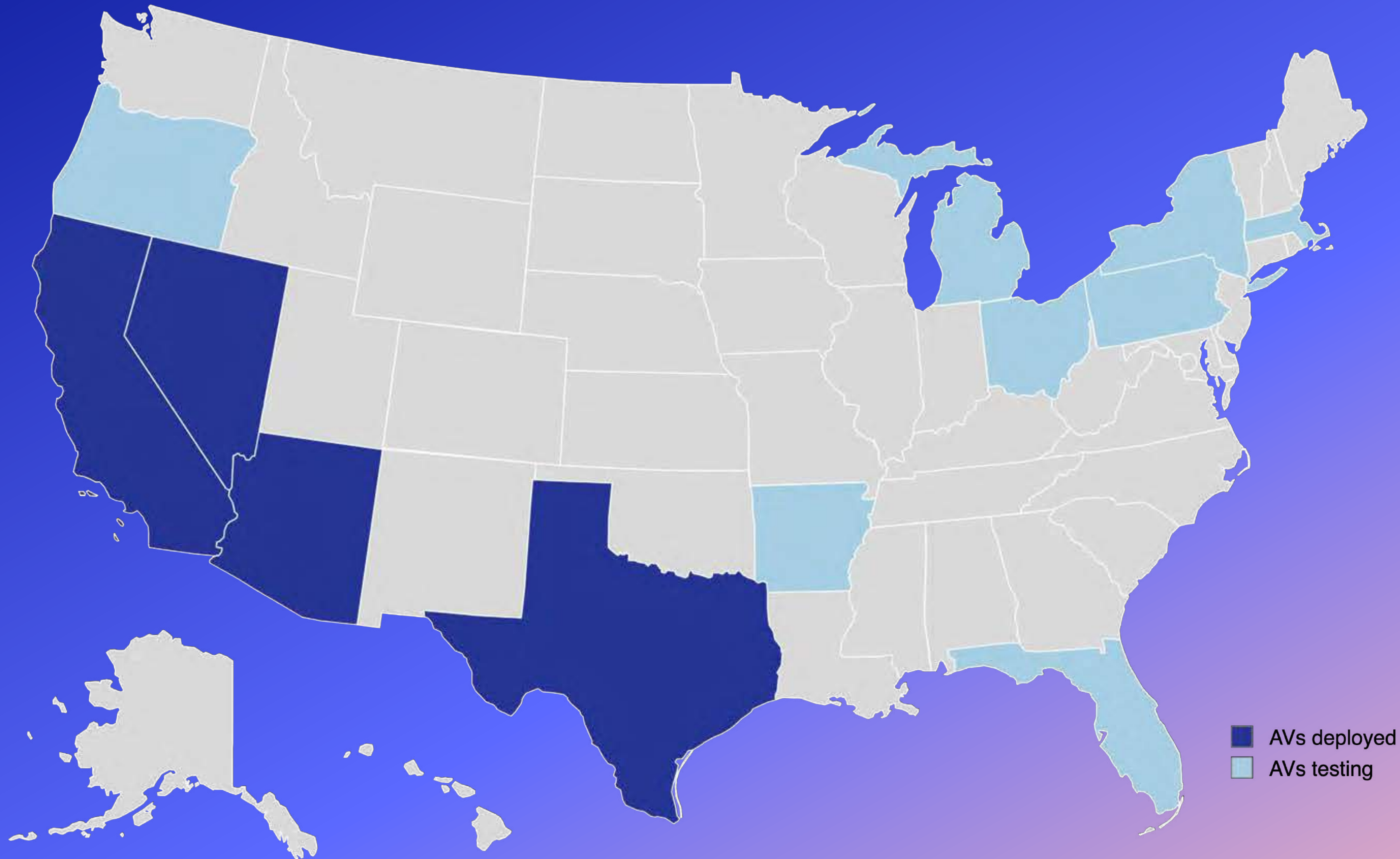
\*Operates within specified ODD, and subject to local law and regulation



ADAS to Autonomy:

Autonomy -- The Road From Here

# Autonomous Vehicles in America Today



# The promise of Autonomous Mobility-As-A-Service

## Autonomous Mobility-As-A-Service



- Helps reduce accidents and save lives

- Helps level out inequalities in mobility
- Enables mobility for groups with limited options (people with disabilities, elderly, etc.)

- Less CO<sub>2</sub>/km (emissions per passenger mile travelled)
- Reduces resource consumption through shared vehicle ownership

- Brings down cost per mile
- Opens up new mobility solutions without requiring investment in infrastructure

- Seamless doorto-door mobility
- Attractive alternative to private car ownership

## Mobility that is...

Safe

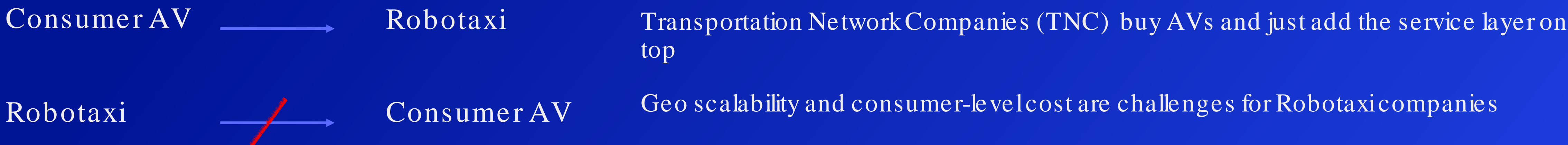
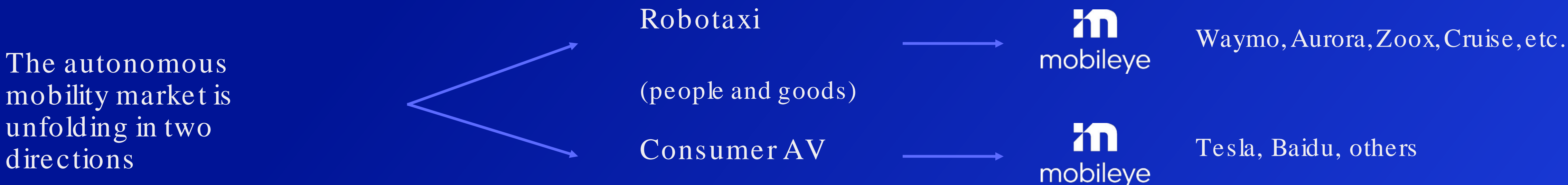
Accessible

Environmentally friendly

Affordable

Convenient

# Roadmap To Mass Market AV Deployment



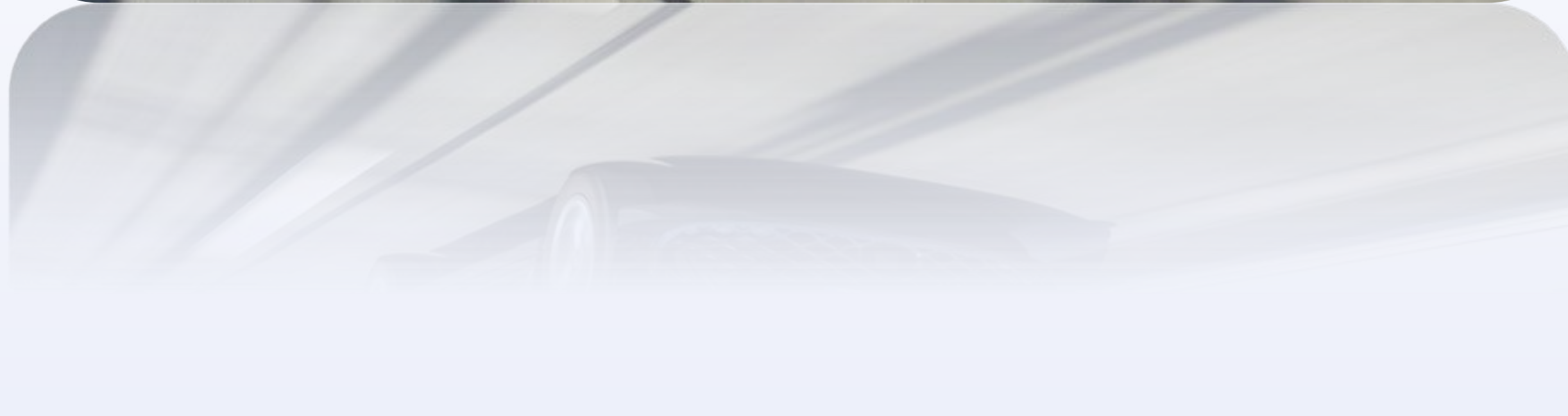
Doing both provides advantages

There are strong synergies between Robotaxi and Consumer AV

Maximizing the learnings from Robotaxi operation can serve as a stepping stone for Consumer AV



# What's next



Thank you!