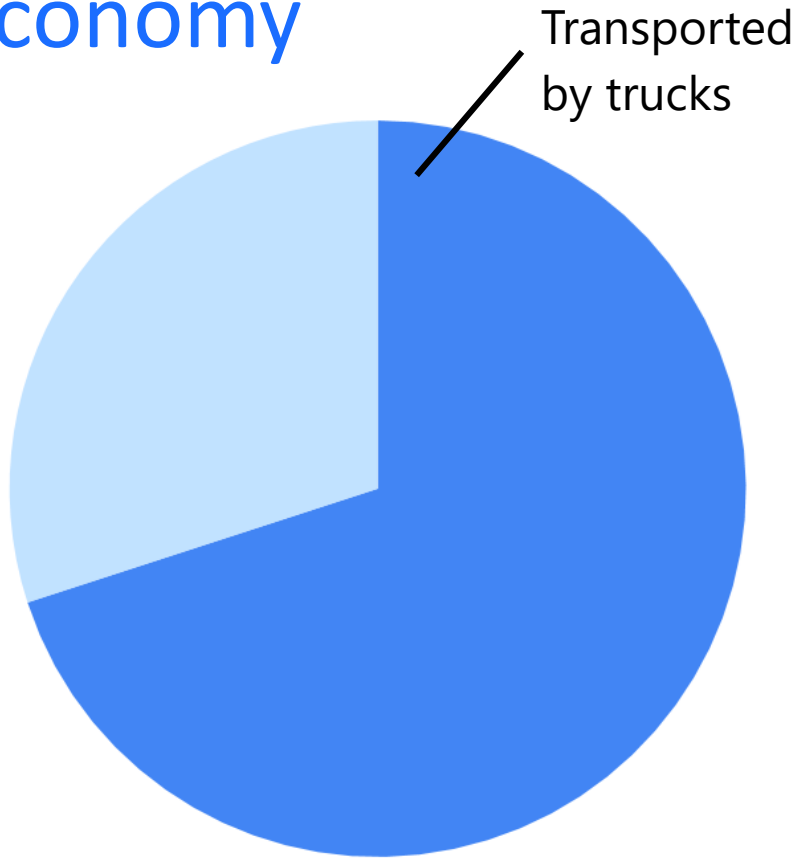




Safe Testing of Automated Trucks

U.S. Economy



Trucks transport 70% of
all goods.

4,000 people die in
truck accidents each year

The only way to
zero fatalities
is self-driving

Advantages of Self-Driving Trucks

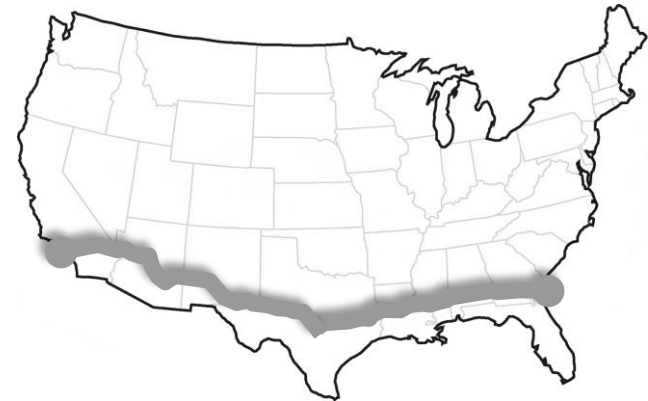
53% lower cost per mile

Cost per Mile*		Savings
Driver Wage	33%	-43%
Driver Benefits	10%	
Insurance	5%	-3%
Fuel	21%	-3%
Maintenance	10%	-2%
Lease	16%	-2%
Other (Permits, etc.)	5%	0%
Total	100%	-53%

*American Transportation Research Institute, An Analysis of the Operational Costs of Trucking: 2017

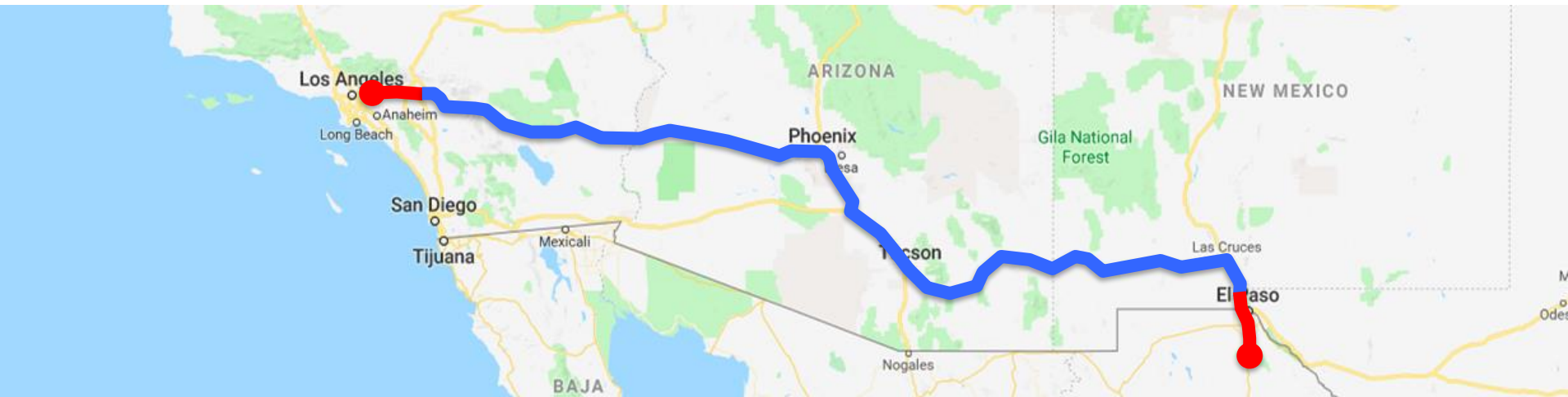
24/7 operation



A self-driving truck can cross the country in 2 days instead of 5.



Truck drivers are limited to 11 hours/day by law.

Embark's freight route with Electrolux:



-  Human Driver
-  Self-Driving

Embark's system is highway-only

Transfers the load to a local driver for city streets



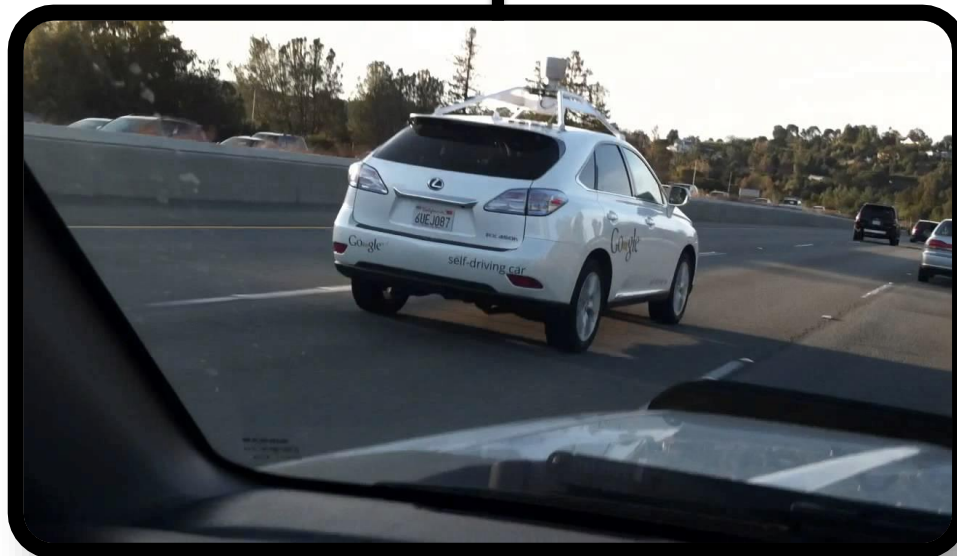
Embark's Milestones

- First to drive through a major city
- First cross-country trip with an automated truck
- First to ship freight for a Fortune 500 customer

How do we do test safely?

You need an attentive driver

Level 0 No automation	Level 1 Driver Assistance	Level 2 Partial Automation	Level 3 Conditional Automation	Level 4 High Automation	Level 5 Full Automation
		Attentive Driver	Inattentive Driver		
		System not responsible		System responsible for safety	



Safety at Embark

Engineering

Drivers

Selection

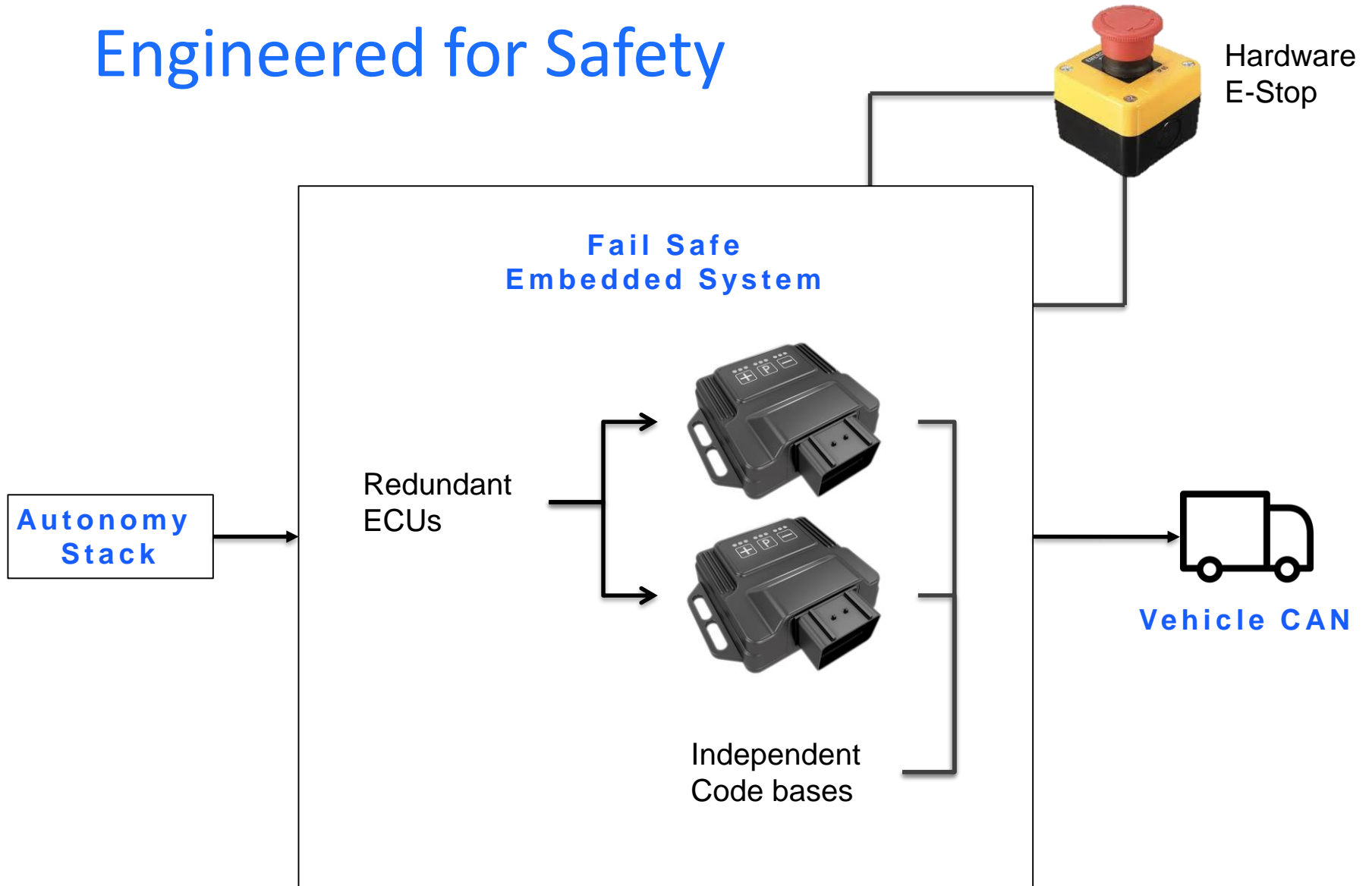
Training

Operating

Engineered for Safety

- No single point of failure
- Run safety checks on all outputs
- Guarantee Driver's ability to disengage

Engineered for Safety



Safety at Embark

Engineering

> Drivers

Selection

Training

Operating

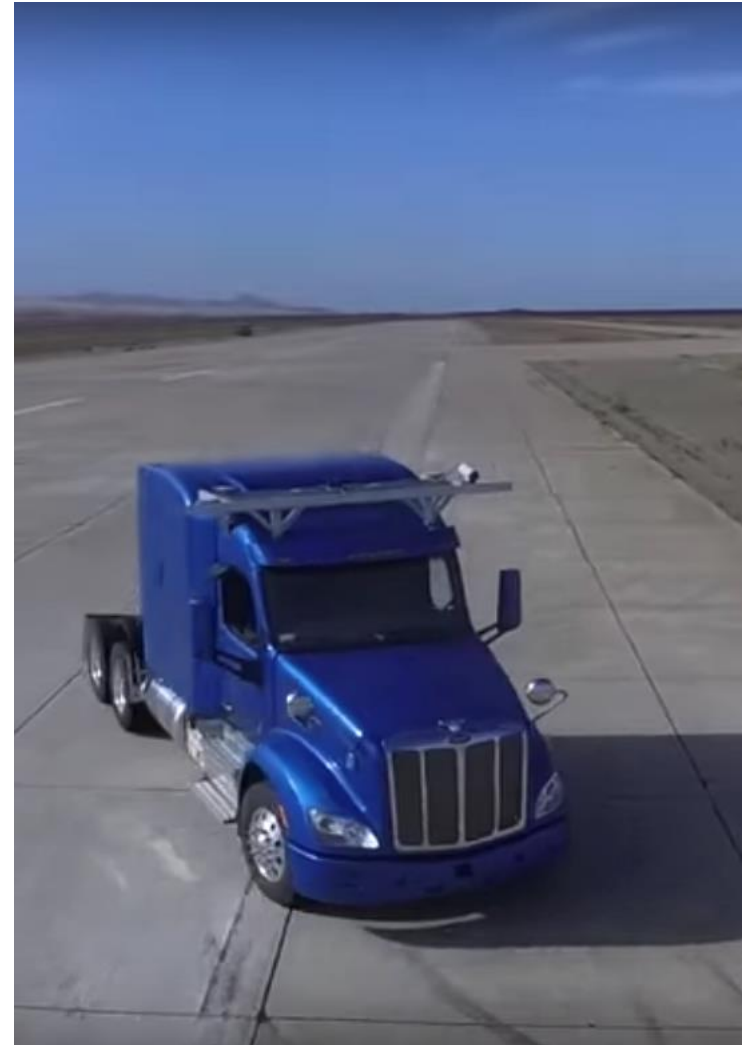
Driver Selection

1. Professional – Specially licensed and trained
2. Experienced
 - i. Our drivers average of over a million miles of experience as a professional driver
3. Good driving record
 - i. We match the standard of the most selective fleets in America

Driver Training

Multi-week Training Program:

- Classroom:
 - Theory
 - Demonstrations
- Test Track:
 - Self-driving practice
 - Fault injection training
- On-road
- Final Exam (DMV Style)



Operations – Safety Policies

- Stricter driving limits than the federal Hours of Service
- All drivers submit to random drug testing
- No phones allowed while the truck is in motion

Operations – Real-time Monitoring

We continuously monitor key safety metrics and provide feedback to drivers in real time:

- Hands on wheel detection
- Driver gaze monitoring

If driver appears distracted, audio and visual warnings go off for 5 seconds. Following which, the system returns control to the driver.

Operations – Audits

Embark records inward and outward facing camera views at all times:



These videos are audited on a weekly basis to continuously improve our processes.

Audits include both random sampling and specific safety events we've identified.

Key Innovations

Top 3 safety processes we'd like to see adopted across the industry:

- Fault injection training
- Real-time gaze tracking and feedback
- Video audits



Thank You.