



INTEL OVERVIEW

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Senior Director – Government Affairs

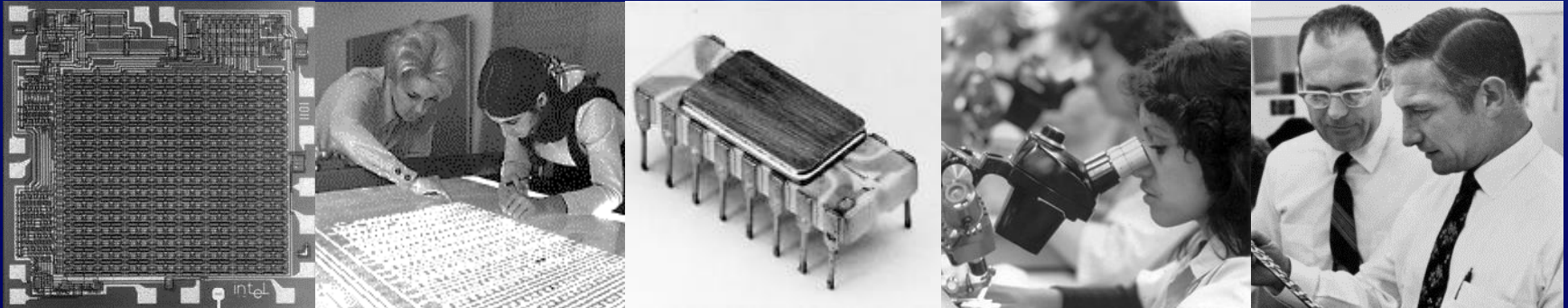
AGENDA

- Intel Overview

- ADAS TO AV: Mobileye journey

HISTORY OF INTEL

- 1968: Intel is founded by Robert Noyce and Gordon Moore
- 1971: World's first microprocessor
- Now: Innovation that expands the reach and promise of computing



INTEL SUSTAINS ARIZONA'S ECONOMY



\$21 BILLION
CAPITAL INVESTMENTS
SINCE 1996



\$500 MILLION
ANNUAL RESEARCH &
DEVELOPMENT



\$900 MILLION
SPENT WITH ARIZONA-
BASED SUPPLIERS



10,400 EMPLOYEES
HIGHLY TECHNICAL
WORKFORCE



\$5.3 BILLION
ANNUAL ECONOMIC
IMPACT IN ARIZONA

OUR AMBITIONS...

**WE ARE IN THE
MIDDLE OF A JOURNEY**

● **2013**
A **PC-Centric**
Company

● **2017-2021**
Data-Centric

● **2021 & BEYOND**
Intel Powers
the **World**

THE DATA EXPLOSION

DATA CREATION

2018
33 ZB

2025
175 ZB

>25% CAGR

SPANNING THE DATA CENTER
TO THE ENDPOINTS

REAL-TIME GROWTH

>**150B**

CONNECTED DEVICES DRIVING

30%

OF CREATED DATA IN 2025

Source: Data Age 2025, sponsored by Seagate with data from IDC Global DataSphere, Nov 2018

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OUR GAME PLAN... LEADING TECHNOLOGY INFLECTIONS

ARTIFICIAL INTELLIGENCE

AI unlocks value from data, enables new business models and experiences

5G

5G transforms the network, increases consumption of data-rich experiences

AUTONOMOUS SYSTEMS

Autonomous systems require real-time analysis of data flows, drive new compute, network architectures

...AND PLAYING A LARGER ROLE IN OUR CUSTOMERS' SUCCESS

DATA GROWTH DRIVES COMPUTE, STORAGE, NETWORK DEMAND

PROCESS EVERYTHING

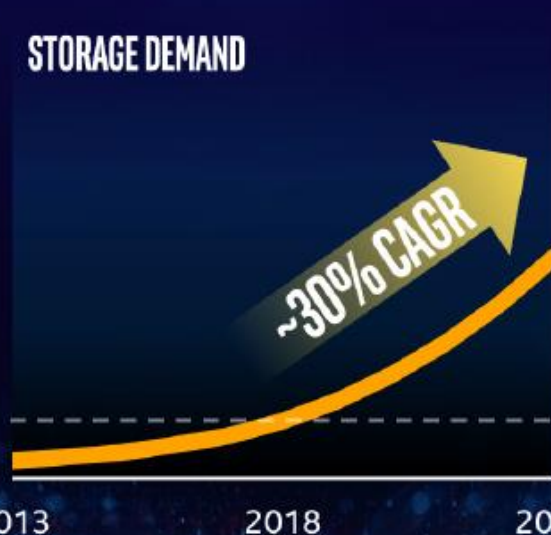
COMPUTE DEMAND



Compute Demand, Data Centers (MIPS)

STORE MORE

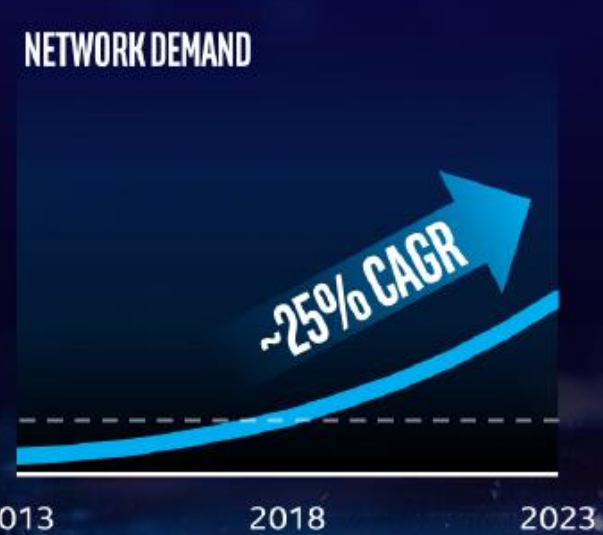
STORAGE DEMAND



Stored Data, Data Centers (ZB)

MOVE FASTER

NETWORK DEMAND



Global Internet Traffic (ZB)



INVESTOR MEETING

Sources: Global Internet Traffic, Cisco VNI Forecasts (2016, 2017, 2018); Stored Data, IDC Data Age 2025 (2018); Compute demand, Intel analysis

OUR OPPORTUNITY... EXPANDED TAM

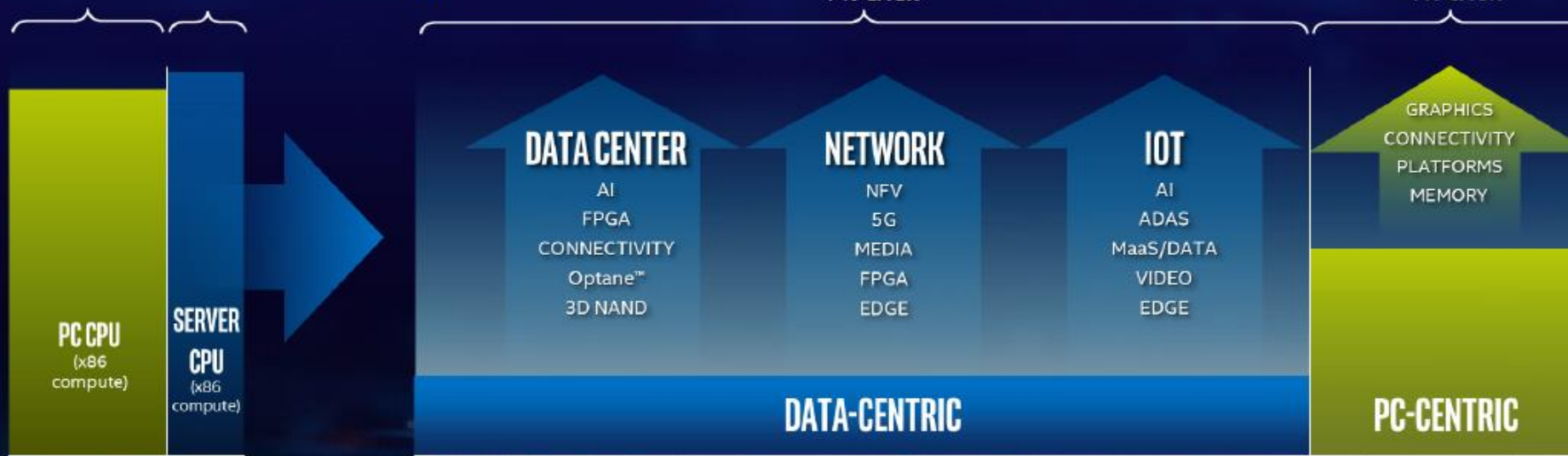
~\$35B ~\$17B

2023
TAM

~\$220B
7% CAGR

~\$68B
-1% CAGR

2018 MSS



FROM DEFENDING MSS...

...TO GROWING MSS



ADVANCED DRIVER ASSISTANCE SYSTEMS: THE ADAS ROAD TO AV REALITY

THE ADAS ROAD TO AUTONOMOUS VEHICLE REALITY

ADAS

Human driver monitors environment



AUTOMATED

Vehicle system monitors environment



THE MANY FACETS OF AUTONOMOUS VEHICLES

And the diverse skills they require



THE NEED FOR VEHICLE SAFETY

Solutions exist to reduce crashes, improve driver behavior, and make the roads a safer place

In 2017, vehicle crashes
cost companies

\$56.7 BILLION

↑19%
since 2013¹

Nearly **80%**
of crashes involve
some form of driver
inattention **3** seconds
before the event²

1.5 seconds of
extra reaction time
could prevent over **90%**
of rear-end and
lane change crashes³

¹ 2018 Driver Safety Risk Report, Motus.

² "Vehicle Accidents and Fatalities Reinforce the Need for Safe Driving." OE Summary 2009-04, Office of Health, Safety and Security. United States Department of Energy.

³ The benefits of early warning systems. AXA Accident Research, 4th Feb 2009, Bettina Sinzig

FORWARD COLLISION WARNING

↓27%

Rear-end
crashes

↓20%

Rear-end
crashes
(w/ injuries)

↓14%

Claim rates –
personal injury

AUTOMATIC EMERGENCY BRAKING

↓50%

Rear-end
crashes

↓56%

Rear-end
crashes
(w/ injuries)

↓21%

Claim rates –
personal injury

REAL-WORLD BENEFITS OF ADAS

IIHS & HLDI 2018 study¹

LANE DEPARTURE WARNING

↓11%

Single-vehicle, sideswipe,
& head-on crashes

↓21%

Single-vehicle, sideswipe,
& head-on crashes
(w/ injuries)

BLIND SPOT DETECTION

↓14%

Lane change
crashes

↓23%

Lane change
crashes
(w/ injuries)

↓12%

Claim rates –
personal injury

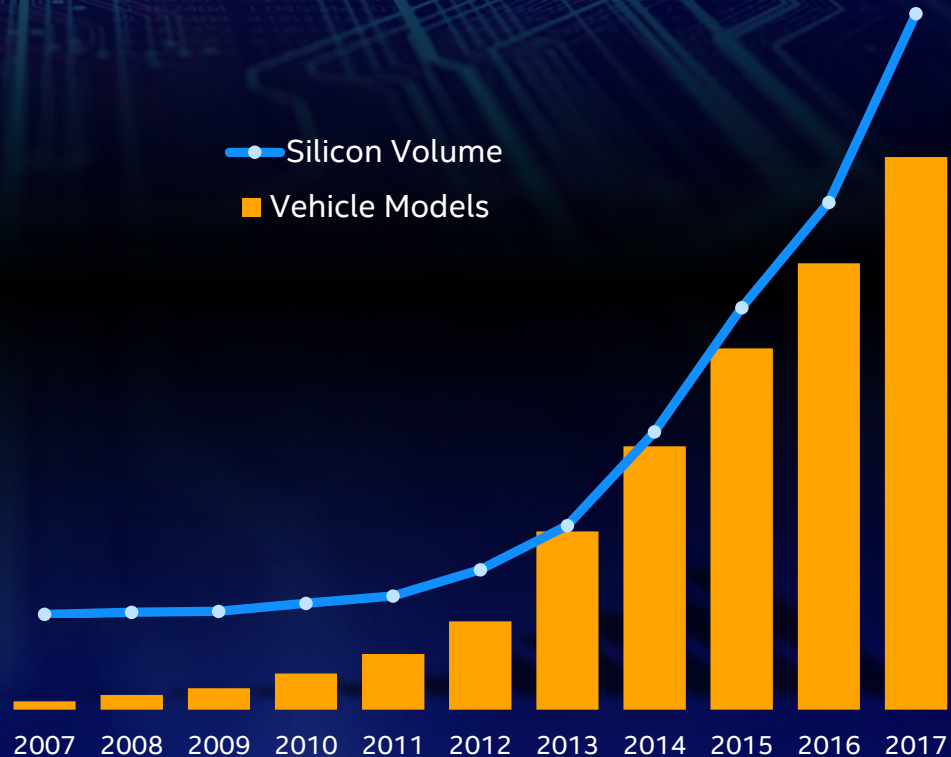
REAL-WORLD BENEFITS OF ADAS

IIHS & HLDI 2018 study¹

THE ADAS ROAD TO AUTONOMOUS VEHICLE REALITY

ADAS

Human driver monitors environment



MICHIGAN DOT PARTNERSHIP



Michigan Governor Whitmer & Mobileye President/CEO

PRODUCT EVOLUTION: SAME MATH



Aftermarket
ADAS



OEM
ADAS



Autonomous
Vehicles

RESPONSIBILITY SENSITIVE SAFETY

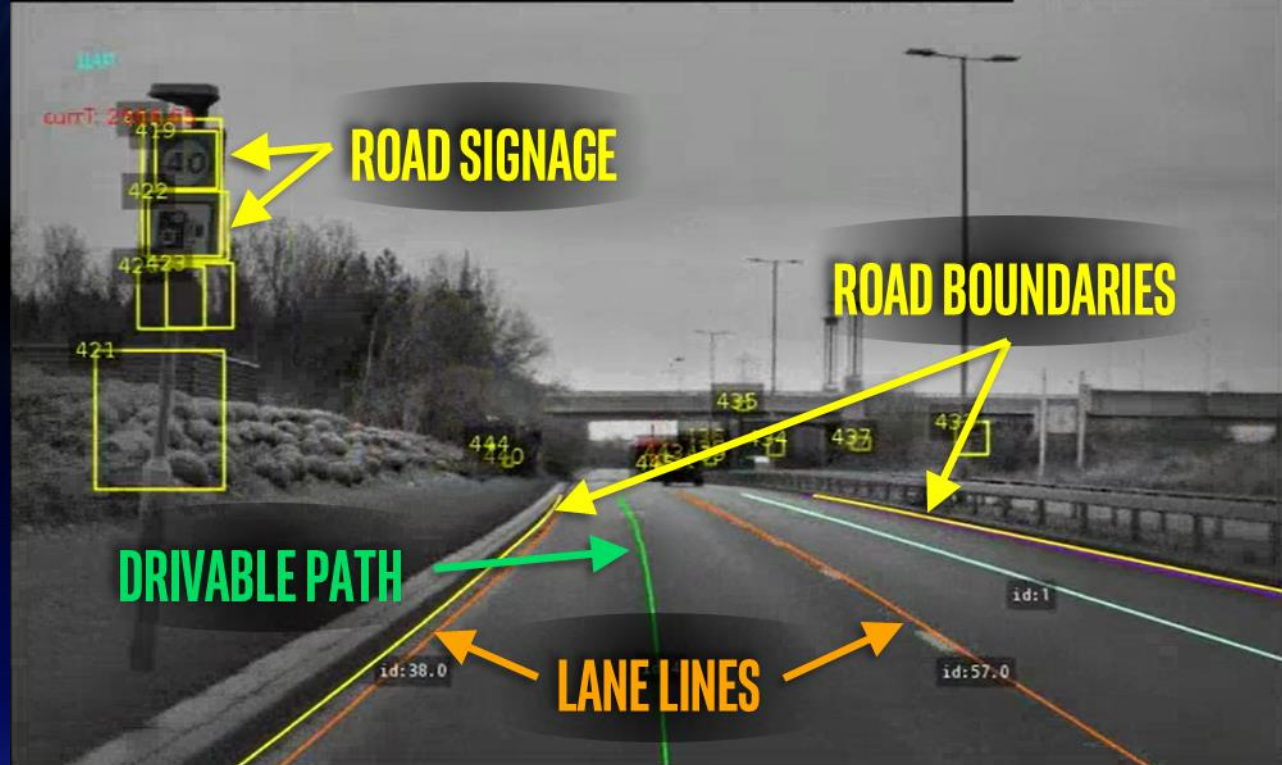
MAPPING & DATA

TRAIN CARS TO SEE THE ROAD AND DO THE MATH:

Cameras detect shape and texture

Distinguish road signs from ads, manholes from potholes, lane lines from road boundaries

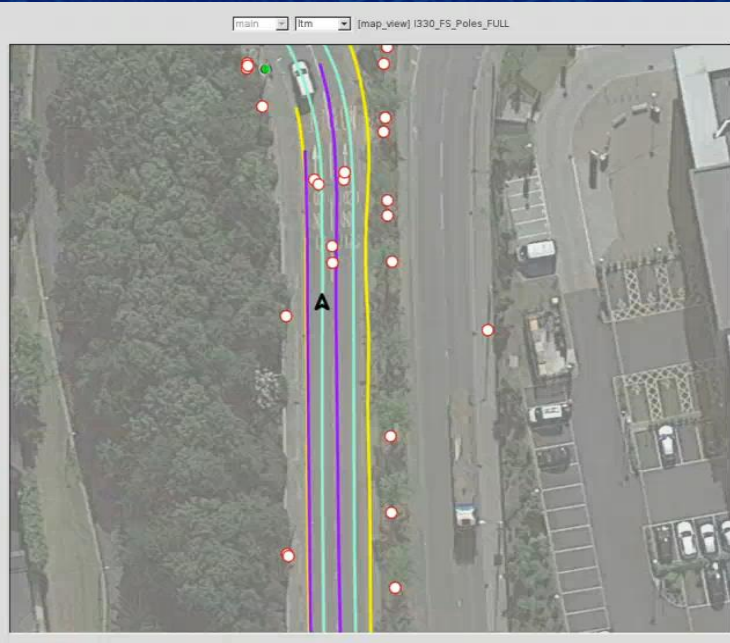
egoSpeed: 15.67 yawRate: -0.88 dtime: 0.03 gfi: 2738



SEE IT IN ACTION



Sensing & classifying relevant road objects



Bird's eye view, projected on Google maps

THE ADAS ROAD TO AUTONOMOUS VEHICLE REALITY

ADAS

Human driver monitors environment



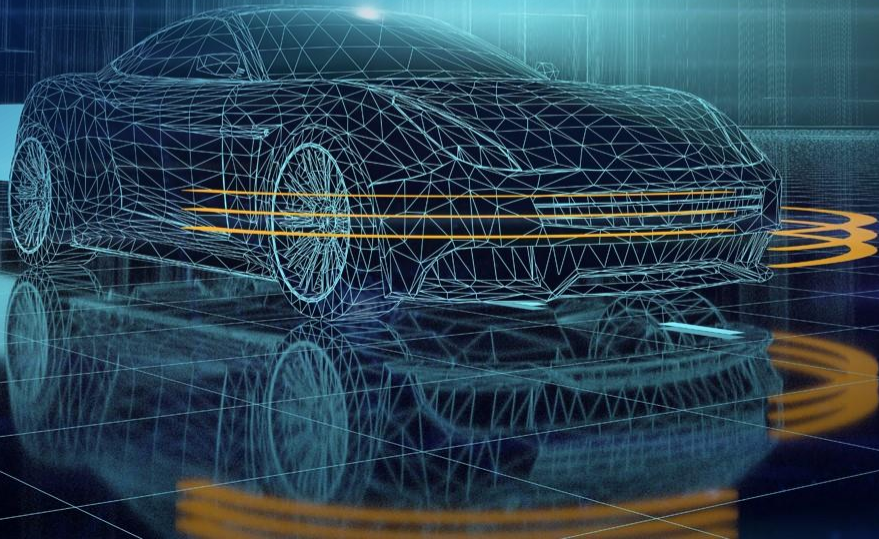
AUTOMATED

Vehicle system monitors environment



AUTONOMOUS VEHICLES

Big bets on the future of
transportation



A ROSY PICTURE IN 2015

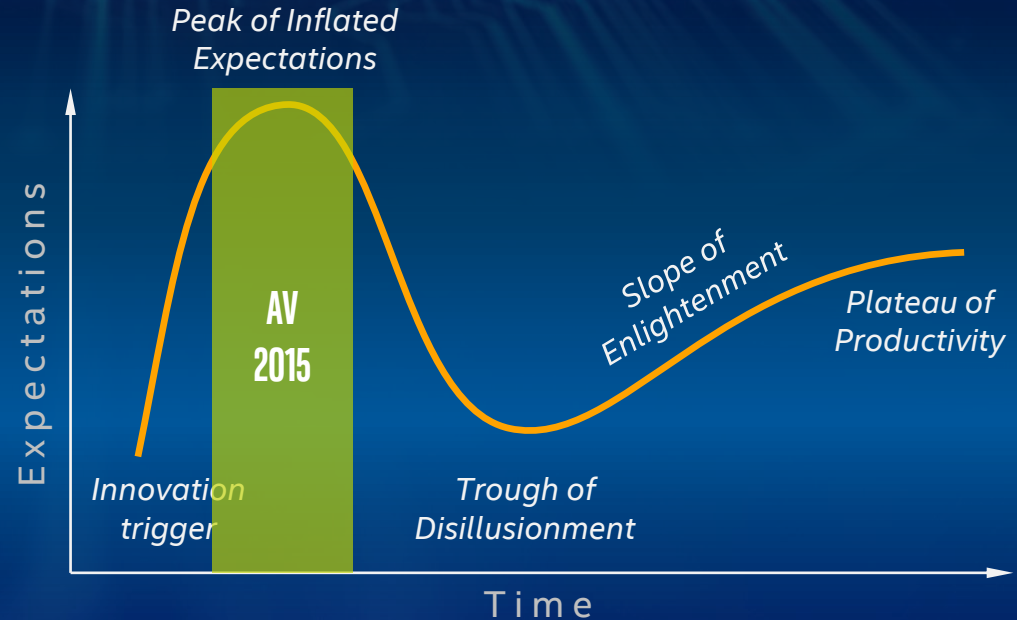
Google's fully functional self-driving car is adorable
CNN Oct 2015

Uber goes on hiring spree for self-driving car project
Fox News Apr 2015

Among the states, self-driving cars have ignited a gold rush
NYTimes Aug 2015

Elon Musk says Tesla vehicles will drive themselves in 2 years
Fortune Dec 2015

GARTNER HYPE CYCLE



A REALITY CHECK IN 2018

China Auto-exec on self-driving cars: 'You can't just put some sensors on top'

WSJ Mar 2018

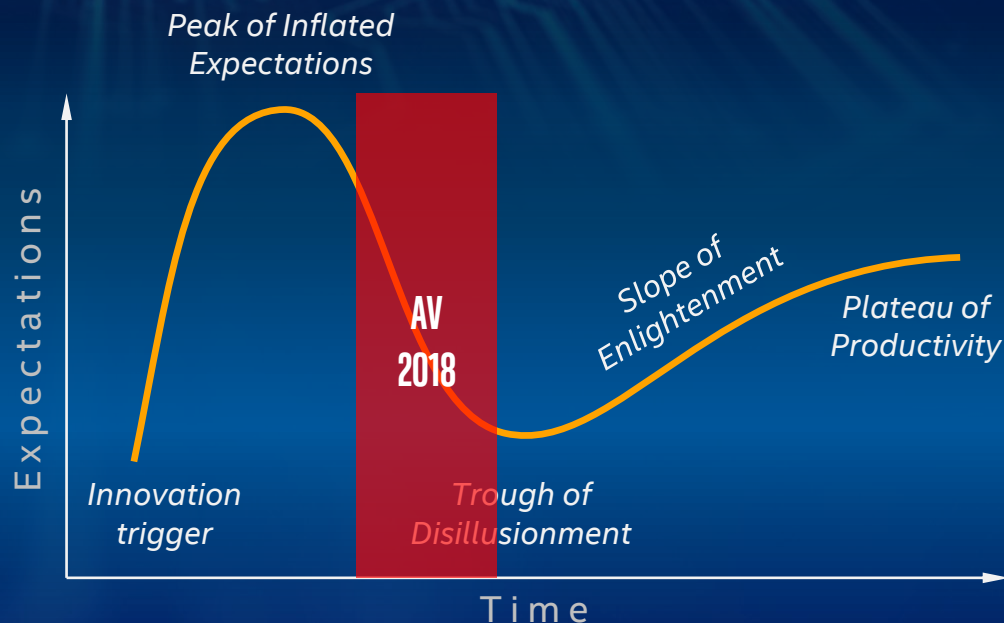
Home from the honeymoon, the self-driving car industry faces reality

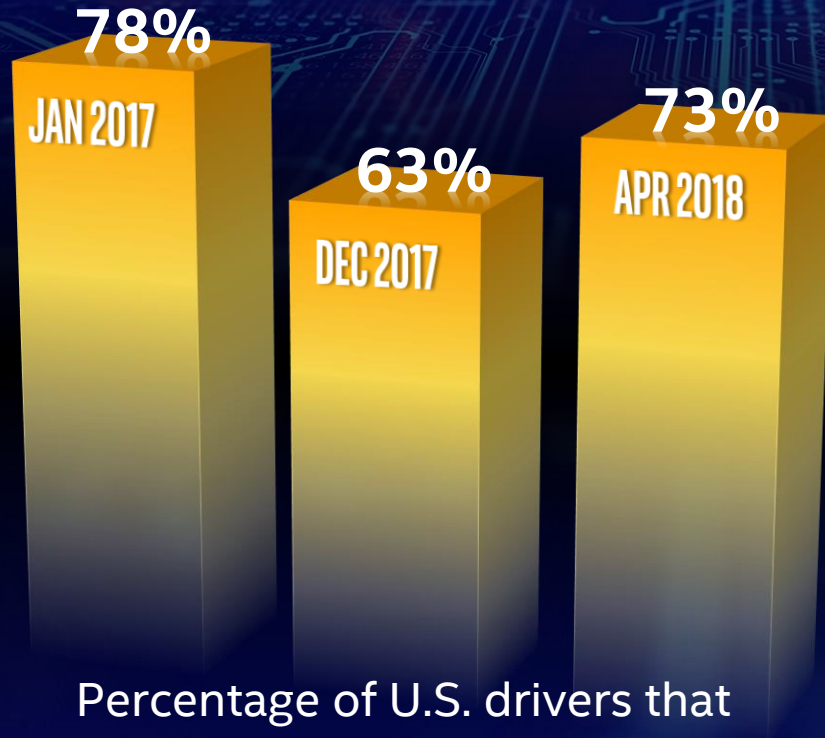
Wired July 2018

Self driving cars are headed toward an AI roadblock

The Verge July 2018

GARTNER® HYPE CYCLE





Percentage of U.S. drivers that
would be afraid to ride
in a self-driving vehicle¹

**TRUST IS HARD TO
EARN**
But easy to lose

DISTRUST & FEAR OF AUTOMATED VEHICLES

More than 20 reported incidents in AZ of threats or harassment directed at automated vehicles, including slashing tires, throwing rocks, and running vehicles off the road.



ARIZONA
COMMERCE AUTHORITY



ADOT



GOVERNMENT

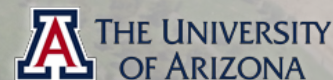
PRIVATE
INDUSTRY

THE IAM
MODEL

ACADEMIA

A consortium of industry,
academia, and government

INSTITUTE FOR AUTOMATED MOBILITY



IAM MODEL & STRUCTURE : #1 IS SAFETY

ACADEMIA

- How safe is safe enough? Defining the minimum requirements and specs, per defined Best Practices
- What should be standard processes across the industry for interacting with AVs during incidents?
- What does ADOT need to do to further plan for infrastructure needs for AVs?
- What are the legal/ethical implications?

GOVERNMENT

- Defining State level regulation and requirements with NHTSA
- What should the process be prior to granting an Autonomous a “driver’s license”
- What does the local measurement process look like? Simulation, test track, email?
- Encouraging industry to continue work in AZ.

INDUSTRY

- Align on Best Practices
- Early understanding and input into any validation and verification expectations
- Common message to consumers regarding safety
- Shared research and expenses.

RESPONSIBILITY SENSITIVE SAFETY (RSS)

FORMALIZE

Human notions of
safe driving



*Keep a safe distance
longitudinally
& laterally*

IDENTIFY

A Dangerous Situation



*Safe distance
compromised in
both directions*

EXECUTE

The Appropriate Response



*Brake to restore
safe longitudinal
distance*



BASIC PRINCIPLES OF A SAFE AUTONOMOUS VEHICLE

5 common sense rules we formalize in RSS

1

DO NOT HIT SOMEONE
FROM BEHIND

2

DO NOT CUT-IN
RECKLESSLY

4

BE CAREFUL IN AREAS
WITH LIMITED VISIBILITY

3

RIGHT-OF-WAY IS GIVEN,
NOT TAKEN

5

IF YOU CAN PREVENT A
CRASH WITHOUT CAUSING
ANOTHER, YOU MUST

REGULATING SAFETY



ABS

First installed **1971**

Standardized **2013**

40+ YEARS



AIRBAGS

Patented **1953**

Standardized **1998**

40+ YEARS



SEATBELTS

Invented **1959**

Mandated **1984-1995**

30+ YEARS

WE CAN'T WAIT ANOTHER 40 YEARS, AND THE INDUSTRY ISN'T

