ROADMAP & CHALLENGES FOR AUTONOMOUS DRIVING
自动驾驶技术路线与挑战
Created leading portfolio of advanced technologies
Global Mobility & Services Capabilities

UNMATCHED POSITION IN MOBILITY & SERVICES WITH DEEP CAPABILITIES IN SOFTWARE DEVELOPMENT, AUTOMOTIVE GRADE INDUSTRIALIZATION AND SYSTEMS INTEGRATION

- ~50 PhDs in applicable fields
- 250+ engineers devoted to automated driving
- ~70 cars today with 150+ on the road by end of 2018
- 10M controllers with embedded OTA by 2020

Locations:
- Mountain View
- Pittsburgh
- Boston
- Wolfsburg
- Singapore
- Shanghai
Urban Mobility CHALLENGES by 2050

- +70% Of Population
- +40% freight
- 5x Emissions
- 4x Cost
- 3x Travel time

BENEFITS of mobility automation to cities

- 28% Fewer Vehicles
- 87% Fewer Accidents
- 66% Lower Emissions
- 44% Fewer Parking Spaces
- 30% Shorter Travel Time
Commercial applications will be first to market and pave the way for consumer applications

Economics
- Adoption driven by economics rather than just safety or convenience (autonomous mobility on demand, ...)

Regulatory / legal environment
- Simplified regulatory and legal environment at the local level vs. federal/state

Use cases
- Limited use cases in commercial applications in contrast with the consumer market – geofenced areas with tele-operations and infrastructure support

Aptiv focused on deploying in AMoD market to develop and validate products and technologies for OEM market
Autonomous driving technology overview

What do I see?

Sensing & Perception:
- RADAR PROCESSING
- LIDAR PROCESSING
- VISION PROCESSING
- V2X
- LOW LEVEL FUSION
- HIGH LEVEL FUSION
- WORLD MODEL AND SEMANTIC/INTENTION MODEL
- LOCALIZATION

Where do I go?

Planning & Policy:
- PLANNING
- POLICY
- BEHAVIOR
- DUAL SOFTWARE STACK: Ottomatika & nuTonomy

Let’s go!

Vehicle Control:
- VEHICLES DYNAMICS / CONTROL
- DYNAMIC MODELING
- OTHER VEHICLE INTERFACES
Sensing and perception: Why autonomous driving needs all three modalities

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Fusion of the three modalities delivers the most robust, safest system
L1 – Simple Architecture
L4 – Future Architecture
Planning and behavior software is the core of the autonomous driving system

**Need for planning and behavior software**
- Planning creates the “path” for the vehicle to drive along
- Leverages both long-term plans (“where am I going”) as well as near-term planning (milliseconds)
- Enables vehicles to have “look and feel” of humans on the road
- Follows traffic rules, understands and learns from how humans behave

**Case for two redundant software stacks**

- **Automotive grade functional safety** requires fully redundant software stacks for fail-operational capability
  - Separate world model, path planning, and behavior and arbitrating control system required
- Two redundant software stacks provides performance benefit over one stack and therefore faster time to market
- Two redundant software stacks becoming **automotive industry standard**

**Automotive-grade autonomous driving software solution requires mix of deep robotics and automotive functional safety capabilities**
Developing an autonomous driving platform

**Autonomous Driving Technology**
Sensors, compute platform, software

**Vehicle Platform**
Partner to deliver vehicle chassis, shell
- 2018-2019: Passenger vehicle
- 2020+: Custom vehicle built for mobility

**Aptiv Autonomous Driving Platform**

**Aptiv cloud elements/ infrastructure and APIs to external partners**

**Mobility Cloud**

**Platform to integrate urban and intrastate mobility services to deliver end-to-end solution**

**Infrastructure**

_Aptiv Overview Presentation | February 2018 | Aptiv_
THANK YOU