Transportation Service Providers, OEMs and Tier 1s are shaping their plans for the opportunities and challenges of autonomous vehicles.

These advancements are being driven primarily by:

**BUSINESS OPPORTUNITIES**

- Large ride-sharing companies spend upwards of ~70% of revenue on drivers share and incentives
- Transportation-as-a-Service (TaaS) fleets

**CONSUMERS’ DEMANDS**

- Safety, convenience and quality time
- Vehicle able to take over an increasing number of tasks currently performed by the driver
AUTONOMOUS DRIVING
Level of Automation, Cost, Timing

LEVEL 1
- Most functions
- Steering (or) acceleration/deceleration
- Hands on the steering wheel + Responsible for lane changes

LEVEL 2
- Hands on the steering wheel + Responsible for lane changes
- Steering (and) acceleration/deceleration

LEVEL 2+
- Hands off
- Eyes on
- Steering (and) acceleration/deceleration + Automated lane changes

LEVEL 3
- Hands off
- Eyes off (but available to take over)
- Steering (and) acceleration/deceleration + Automated lane changes

LEVEL 4
- Hands, Eyes off + Mind off
- Fully automated driving under limited conditions (does not work in unmapped areas)

LEVEL 5
- Fully automated driving under all conditions

**HUMAN**

**RESPONSIBILITY**

**MACHINE**

**DRIVER**

**SYSTEM**

**COST**

- Automotive-Grade: Now
- x
- 5x
- 30x: 2020 - 2021
- 60x: 2023 - 2025
- TBD

**SYSTEM**

**HUMAN**

**MACHINE**

**RESPONSIBILITY**
AD SYSTEM - ARCHITECTURE

PERCEPTION
- Radars
- Cameras
- Lidars
- Maps

PRIMARY CONTROLLER (BRAIN)
- PRIMARY DRIVING POLICY
  - Optimizes comfort and efficiency
  - Higher weight on AI for decision making

SECONDARY DRIVING POLICY
- Optimizes safety
- More traditional rule-based decision making

COMPARATE
- Determine optimum safe path

BACKUP CONTROLLER (BRAIN)
- Guides vehicle to safe stop if main controller fails

MOTION CONTROL
- Convert path to actuation

ACTUATION
- Acceleration
- Braking
- Steering
AUTONOMOUS DRIVING
Hardware at Level 4

Cloud Connectivity

- Mid-Range Radar Rear Left
- Long-Range Radar Rear Left
- Long-Range Camera Rear
- Long-Range Radar Rear Right
- Mid-Range Radar Rear Right
- Mid-Range Lidar Rear Right
- Short Range Radar
- Side Camera Facing Front Left
- Side Camera Facing Forward Right
- Capacitive Wheel
- Map Database
- Vision Processor
- GPS/IMU
- Backup Brain
- Primary Brain
- Redundant Power Supply
- Driver Monitoring Camera
- Front Camera
- Long-Range Camera Front
- Telematics Box Module
- Mid-Range Lidar Front Left
- Lidar Front
- Long-Range Radar Front
- Mid-Range Lidar Front Right
- Mid-Range Lidar Front Right
- Mid-Range Radar Front Right
- Mid-Range Radar Front Left
- Mid-Range Radar Front Left
- Short Range Radar
- Driver Alert Lighting Module
- Side Camera Facing Rear Left
- Side Camera Facing Rear Right
- Side Camera Facing Rear Right
- Cloud Connectivity
- Mid-Range Lidar Rear Left
Connectivity is essential and enables the driver and passengers to interact with the car and the world around them.
CONNECTED CARS

• Retrieve and manage in-vehicle and environmental data through the Cloud
• Predict maintenance
• Offer services and information
• Create an engaging experience of Brand-related ownership
• Keep the customer connected to their home and office
CONNECTIVITY SYSTEM LAYOUT AND ARCHITECTURE

ON-BOARD TELEMATIC BOX MODULE (TBM) CONNECTING THE VEHICLE WITH INTERNET AND FCA SERVICE DELIVERY PLATFORM (SDP)
OFF-BOARD CONNECTIVITY

The Service Delivery Platform is a cloud based open architecture:

- Scalable and flexible to support services and technology evolution
- Maximum cybersecurity
- Easy to integrate and interface with any service provider
CONNECTIVITY GENERATES EXTENSIVE BENEFITS TO MULTIPLE STAKEHOLDERS IN THE ECOSYSTEM
SERVICES

- OTA UPDATE
- FIRMWARE OTA UPDATE
- MAINTENANCE VEHICLE HEALTH REPORT
- INFOTAINMENT STREAMING MEDIA
- SAFETY AUTOMATIC SOS CALL
- SECURITY STOLEN VEHICLE LOCATOR
- NAVIGATION
- TRAFFIC & WEATHER
- DRIVING STYLE ECO COACHING
- CONVENIENCE
- REMOTE SERVICE
- USAGE-BASED INSURANCE
- EV SPECIFIC CHARGING POINTS
- CONNECTED SERVICES
  - Futureproof
  - Expandable
  - Adaptable

MULTIPLE TOUCHPOINTS

- HEAD UNIT
- MOBILE APP & SMARTWATCH
- WEBSITE
- CALL CENTER

CALL CENTER
OUR DEPLOYMENT PLAN

GLOBAL CONNECTIVITY PLAN
CORE TECHNOLOGIES FOR AD

HIGH-SPEED COMPUTING

COMPUTER-VISION & IMAGE-PROCESSING

EXTENSIVE SOFTWARE DEVELOPMENT INCLUDING AI

SENSOR & SENSING TECHNOLOGY
OPTIONALITY AND CHOICES

DO...

- Be present and close to AD developments
- Diversify approach in areas with highest probability of success
- Access pool of technologies through collaborations
- Become beneficiaries of artificial intelligence and machine learning

DON'T...

- Pay heavily for the experimentation
- Make bold choices which limits freedom and entails high risk
- Place dependency for success on a single plan or path
- Presume novices can be prescribers
"...global revenues from self-driving technology by 2030 will be up to $2.8tn, with Alphabet’s Waymo potential global leader in the MoD area..."
FCA TO PURSUE MULTIPLE PATHS
Autonomous Driving

FCA TO PARTNER WITH THREE OF THE MAJOR TECHNOLOGY PLAYERS IN AUTONOMOUS DRIVING AND ARTIFICIAL INTELLIGENCE

- WAYMO
  GOOGLE'S SELF-DRIVING TECHNOLOGY COMPANY
- BMW
  PREMIUM OEM
- APTIV
  TIER 1 IN AD
PARTNERSHIP WITH WAYMO
The clear leader in Level 4 technology

Up to 62,000 Pacifica Hybrids over the next three years

FCA AND WAYMO BEGINNING DISCUSSIONS ON DEVELOPING A WAYMO-EQUIPPED FULLY SELF-DRIVING VEHICLE FOR FCA RETAIL CUSTOMERS
PARTNERSHIP WITH BMW
Level 3 system for highway application

FURTHER DEFINED PARTNERSHIP STRUCTURE

DEVELOP AUTONOMOUS TECHNOLOGY FOCUSED ON LEVEL 3

FCA Engineers embedded with BMW Teams at BMW’s AD campus near Munich

SHARE RESOURCES INCLUDING DATA FOR VALIDATION & RELIABILITY TESTING

SHARE UNDERLYING INVESTMENTS
PARTNERSHIP WITH APTIV
The most advanced Tier 1 in L2+ systems

EXPANDING COLLABORATION
OF AUTONOMOUS TECHNOLOGY
STUDIES AND DEVELOPMENT PROJECTS

L2+ SYSTEMS TO BE INTRODUCED IN FCA 2020CY LAUNCHES
FCA’S MULTI-PRONGED APPROACH:

- **BROAD ACCESS TO A RANGE OF TECHNOLOGY**
- **DELIVER NEAR-TERM ADVANCEMENTS**
- **PARTicipate in the MoD/TaaS revenue streams**
- **Among the first OEMs to retail market**