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Data Sovereign Collaboration Platform for Autonomous Vehicles

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Abstract

- In today's digital world, data sovereignty becomes a big area of concern for various countries. Governments across the globe are enacting new and stringent laws for data sovereignty. This is pushing various industries specifically the autonomous vehicle industry to innovate more and create new business models for data sovereignty compliance. This mandates for a data collaboration platform that ensures data sovereignty and enables Data Driven Development of Autonomous Driving built on the principles of distributed architecture to solve various challenges faced by autonomous vehicle development teams

Agenda

- What is Data Sovereignty?
- What are Autonomous Vehicles?
- Challenges in building autonomous vehicles
- Autonomous Vehicles Rapid Collaboration Platform (AV RCP)
- Key Features of AV RCP
- Architecture of AV RCP
- Deployment Options
- Benefits of AV RCP
- RCP Extensibility
- Conclusion

What is Data Sovereignty?

- Data sovereignty is a country-specific requirement
- Data is subject to the laws of the country in which it is collected
- Data collected must remain within its borders
- Data sovereignty focuses on the idea that data has a national home
- In Autonomous Vehicles, huge sets of data is collected from real world for creating a precise model of the world
- This data needs to adhere to the specific data sovereignty requirements of the country where it is collected

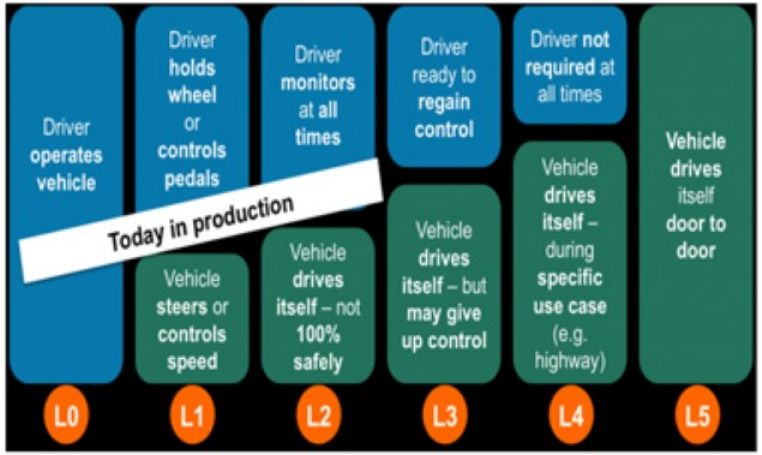
Autonomous Vehicles (AVs)

What are Autonomous Vehicles?

- An autonomous vehicle is a vehicle that is capable of sensing its environment and moving safely with little or no human input.
- How AV is achieved?
  - **AV** rely on sensors, actuators, complex algorithms, machine learning systems, and powerful processors to execute software.
  - Radar sensors monitor the position of nearby **vehicles**. Video cameras detect traffic lights, read road signs, track other **vehicles**, and look for pedestrians
  - Sensing technologies, including cameras, radar and Lidar systems for image detection and geolocation are the key

- **AV Classification**

Level 0	•No Automation
Level 1	•Driver Assistance
Level 2	•Partial Automation
Level 3	•Conditional Automation
Level 4	•High Automation
Level 5	• Full Automation



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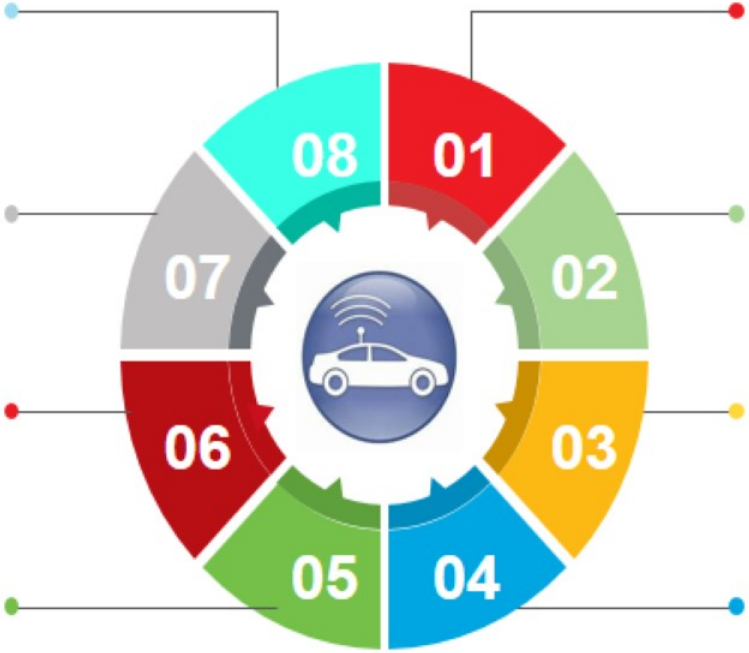
Autonomous Vehicles – Key Benefits

More Efficient Parking

More Effective and Affordable Taxis

Reduced Travel Time and Transportation Costs

Lower Fuel Consumption



Reduced Accidents

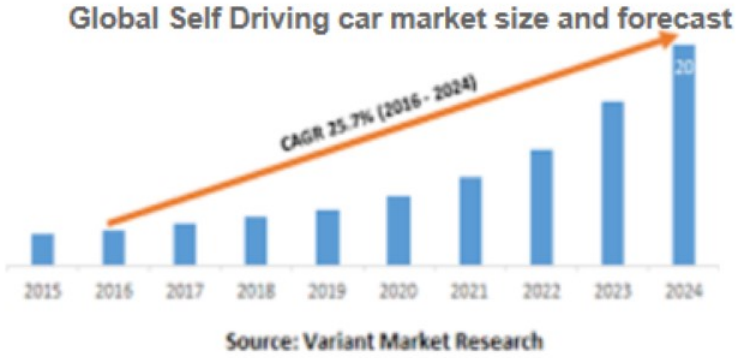
Reduced Traffic Congestion

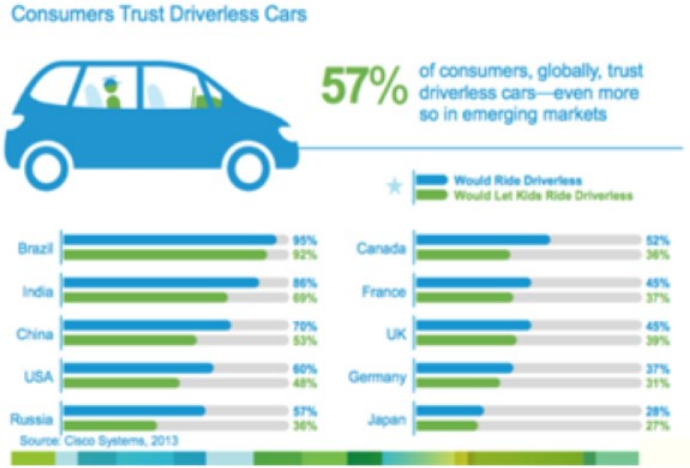
Reduced CO2 Emissions

Increased Lane Capacity.

Autonomous Industry Trends:

- With 25.7 % CAGR, autonomous car market will grow $20B by 2024
- As per Statistics, expect to see one in 10 cars to be fully automated by 2030
- Over the next decade, the market for self-driving cars will contribute $13.7 billion to the economy
- 57% of consumers Globally trust Autonomous cars

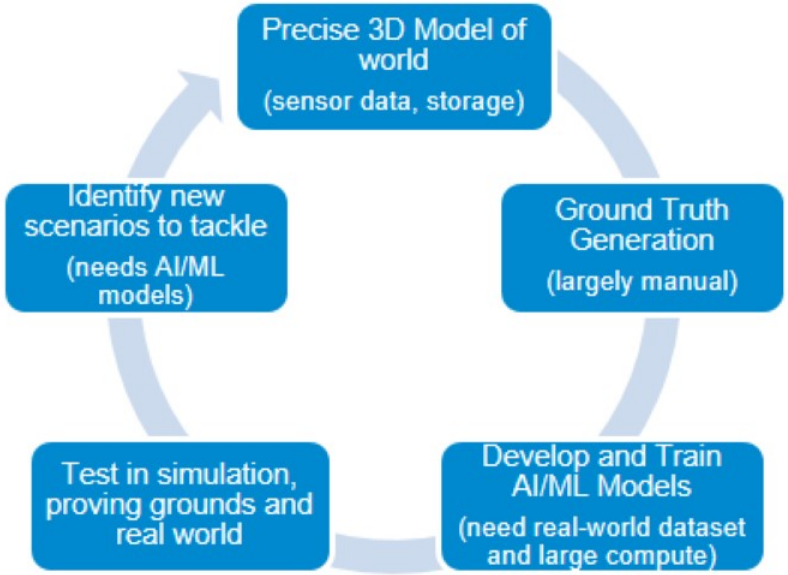




Challenges in building AVs

- Massive road networks
- Endless new scenarios
- Multiplying factors (weather, light, road surface, obstacles)
- Precise localization (cm level accuracy)
- Motion prediction of self, surrounding objects
- Zero tolerance for error
- Replicate human brain

Autonomous Circle



Rapid Collaboration Platform (AV RCP)

Key Features of AV RCP

Data Ingestion

- Near Real-time - Sensor data can be collected near real time at testing center
- Batch / Offline – Batch processing of data to save network bandwidth.

Data Collaboration

- Data Catalogue, Sub-setting, Labelling
- Data Dedupe, Validation
- Meta data search, extraction & preview
- Distributed data storage
- Data upload, download, feedback & life cycle management

Data Insights

- Platform monitoring
- Alerting & messaging
- Log analysis
- Data Lineage

Data Processing

- Data Compression
- Distributed Edge Computing (for ROS and other data formats like ADTF, HDF5)

Data Compliance

- Secured communication
- Data Auditing / Lineage
- User Management Services
- Support to process and retain data at the source/edge

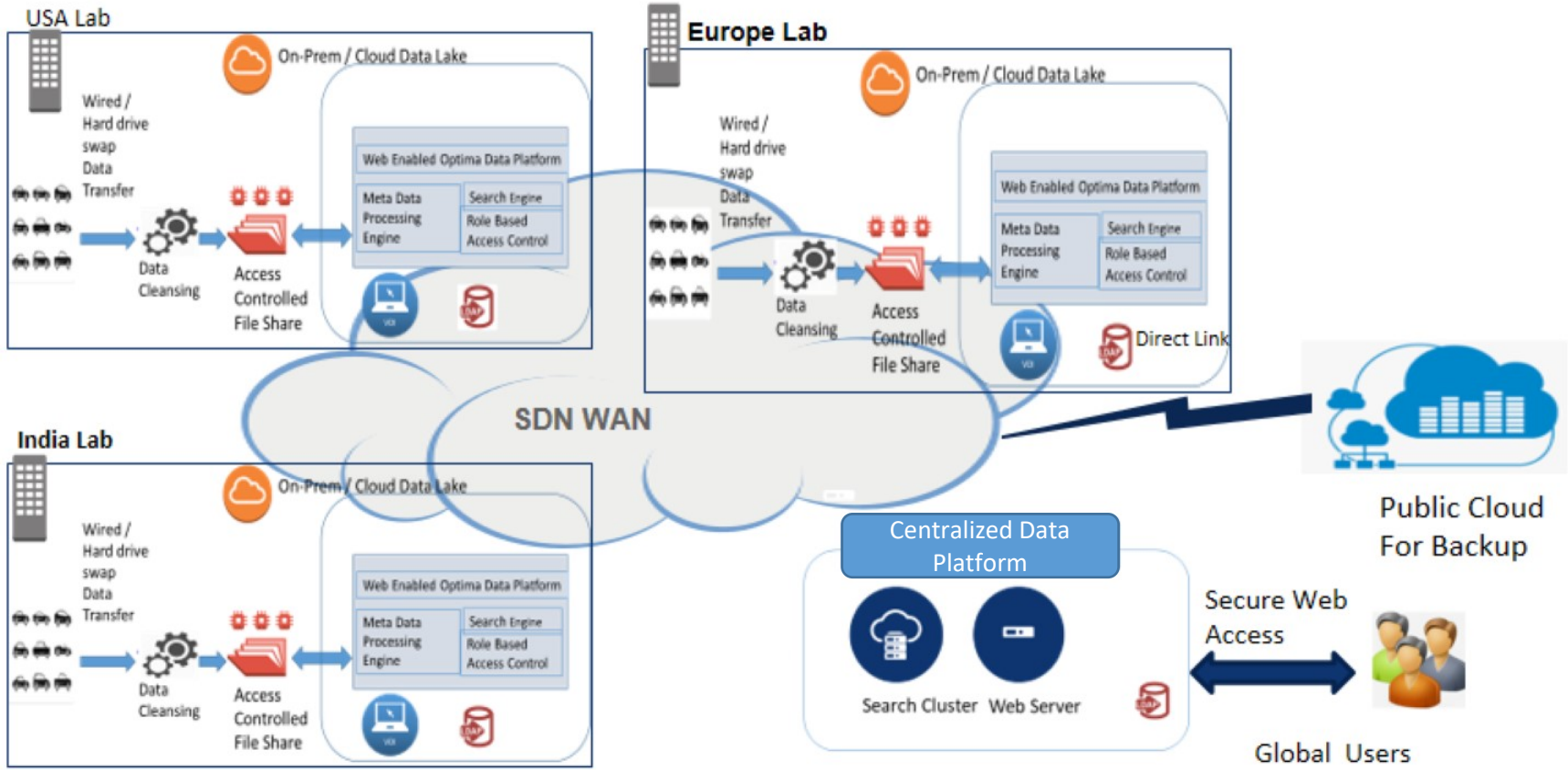
Data Access

- REST APIs enables it to integrate with downstream applications
- Secured data transmission using standard or customized encryption

AI/ML Support

- Basic Computer vision tasks – libraries and ML modules for Annotations, labelling, segmentation etc.
- Model publish and updates

Distributed Architecture



Deployment Options

On Premise

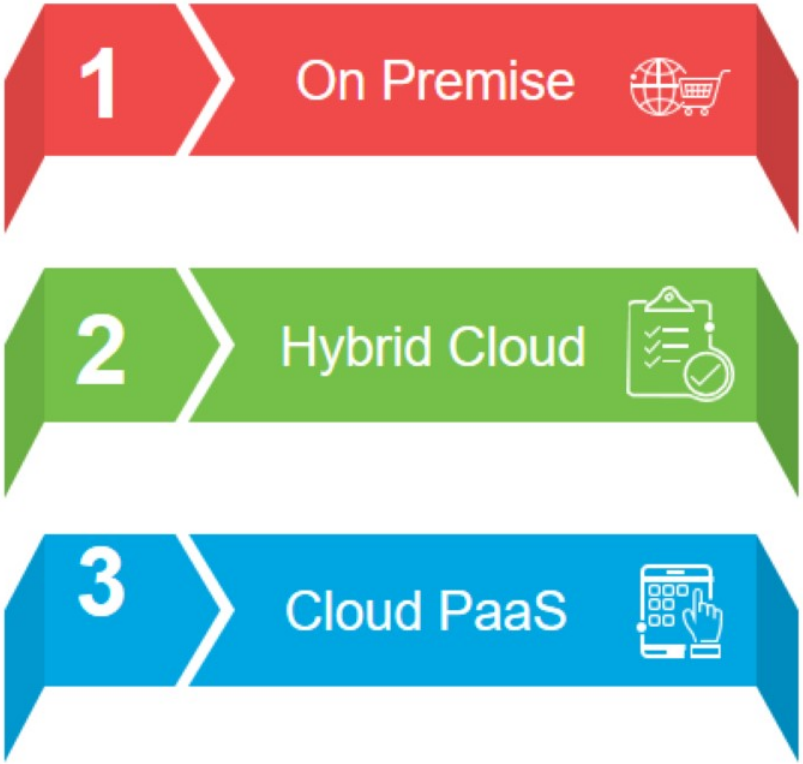
Most of the customers prefer on premise deployment model and AV RCP fully supports this model

Hybrid Cloud

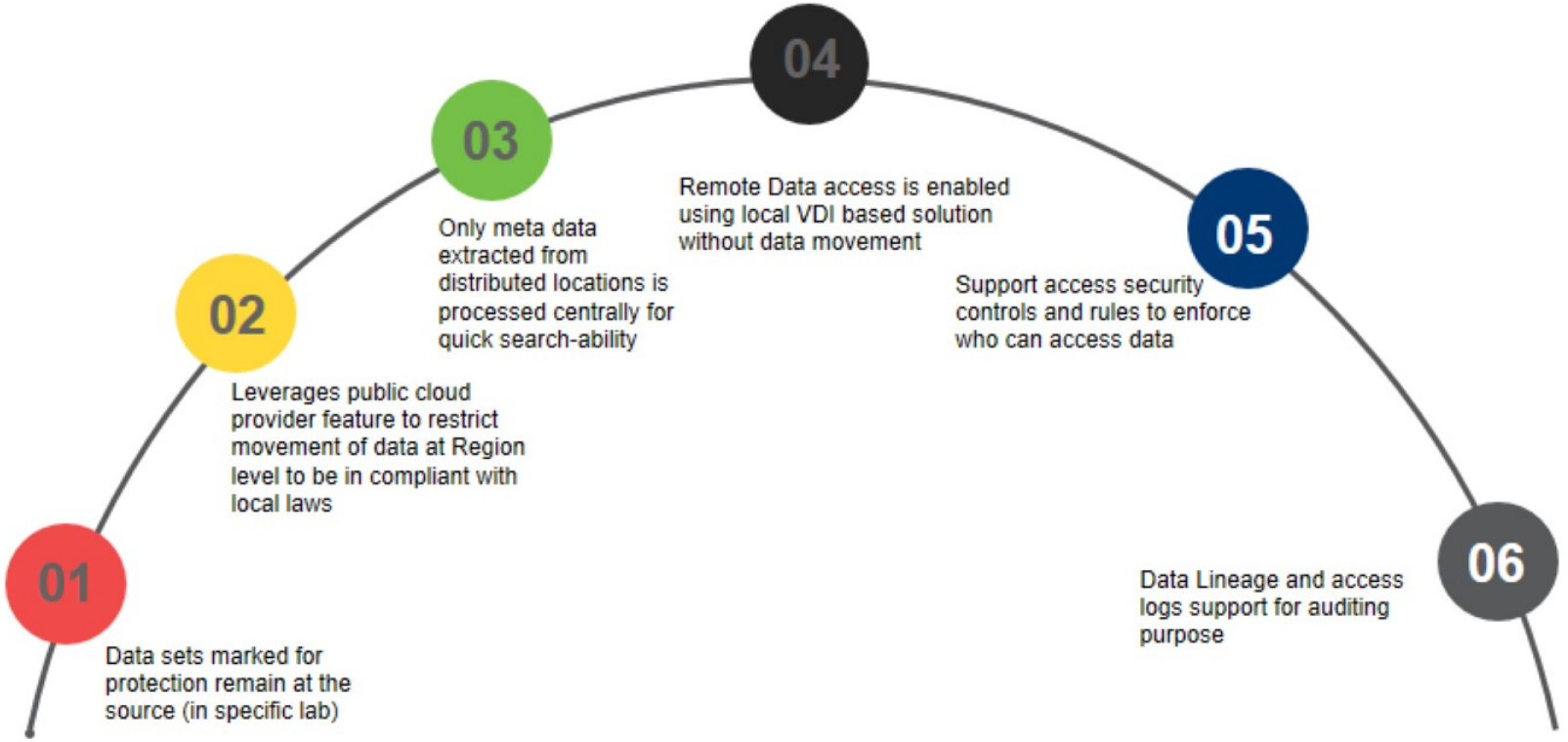
AV RCP supports Hybrid cloud deployment model. In this model, high computation (Simulation, AL / ML) and storage archival are leveraged from Cloud based services and rest of the functions retained on premise

Cloud PaaS

AV RCP support PaaS services. It exposes RESTful APIs so customers can use RCP platform services



How AV RCP addresses Data sovereignty?

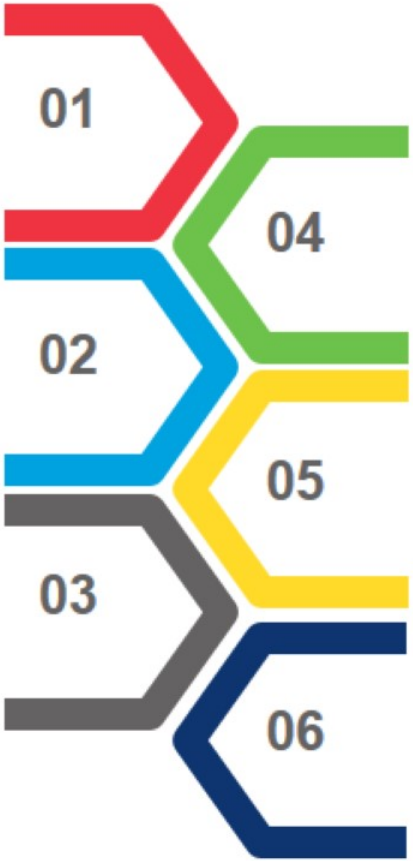


Benefits of AV RCP

Lower cost of infrastructure
Significant reduction in infrastructure cost as the platform has small footprint and can be deployed in lab infrastructure

Better utilization of network bandwidth
Solution supports distributed architecture, which ensures less network bandwidth requirement

Low cost of ownership
Integrated component based modular and extensible framework



Collaborative work
Enable dev, test and data scientists to use resources spread across global test labs

Flexible deployment models
Supports on-premises and hybrid cloud deployments

Data Compliance
The distributed architecture ensures data is processed at the source without crossing geographical jurisdictions

Extensibility

Platform's modular and extensible capability helps in extending to various other industry domains

- Oil Drill Collaboration Platform
  - Geo scientists, drilling engineers and completion engineers can collaborate while rapidly accessing all available optimally conditioned data
  - Enables to identify and build the best Well Path to drill a well

- Smart Grid Collaboration Platform
  - Provide an end to end Collaboration platform for transforming Power Grid to Smart Grid
  - Enables energy security and environmental sustainability

Conclusion

- ✓ Data sovereignty is a big area of concern in the age of cloud computing with global development centers for processing and persisting data
- ✓ A collaboration platform that can address these concerns but enable to perform Business as Usual activities is very essential
- ✓ AV RCP with its distributed and scalable architecture addresses data sovereign concerns by processing data at its source but at the same time enabling various users of the platform spread across the globe to collaborate
- ✓ The platform is extensible and can be extended to other industry domains as well

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