**Challenges cloudera:**

**Challenge1: Volume/Menge an Daten:**

Per car:

* 2 petabytes of data per year total
* Significant data:
  + 25 GB per hour
  + 130 TB per year
* Flexible storage store any and all date in Kudu and HDPS
* Data used for data warehouses and real time applications

Acquisition and analysis of more than 30000 signals and data points from sensors

**Challenge2: Variaty**

Various data types:

* Data from ECU
  + Speed, fuel, temp, brakes etc.
* Location
* Safety data
* Camera recordings (computationally intensive)

Data must be partially streamed in real time.

* Data Sources:
  + ECU Electronic control Unit
  + Vehicle Plug ins
  + Head units
  + Cameras

**Challenge3: Velocity**

Separation into On Edge and Cloud Analytics

* Edge: Fast immediate calculation necessary, braking times, accident detection.
* Cloud. Computationally-intesive analytics, mashine learning, time series, trends.

**Challenge4: Veracity:**

Four pillars of security. perimeter, access, visibility, data and recording service.

**Challenge5: Value**

the most important use cases:

* Predictive maintenance
* Usage-based insurance
* Public services

Targets:

* 150 trillion in revenue
* 250 million connected vehicles
* Quadruple revenue

Benefits:

* 80% fewer alcohol-related accidents
* Predict maintenance intervals
* Automatic driving
* Entertaiment
* Comfort and safety

**Challenges level 1 to level 4**

**Level 1: Data Source Layer**

Very many data sources both structured and unstructured.ECU

* + Vehicle Plug ins
  + Head units
  + Cameras
  + Problem: Many different data types

Tools:

* + SQL
  + NoSQL
  + Kafka
  + Flume..

**Level 2: Data Storage Layer**

Hadoop Hbase (NoSQL) storage concept:

* Streaming vehicle data
* Geolocation
* Manufacturing Supplier
* Parts and warranties
* Maintenance data
* Dealer data
* Customer data

All this data is collected for later analysis.

Problem: New data must be read in every 5 seconds.

**Level 3: Processing Layer**

* Direct access to Data Storage:
  + Statistical methods
  + Machine Learning
  + Artificial Intelligence and Deep Learning

Potential use cases:

* Prdictive maintenance to improve performance and reduce downtime for fleets.
* Based on insurance to reduce claims by a major European insurance agency
* And many more

**Level 4: Data Output Layer**

* Visualization via cloudare BI website.
  + Calculation of aggression value to compare different drivers.
  + Comparison accidents vie aggression values and correlation between this value and oil/brake replacement.
  + And much more.