Towards a harmonized infrastructure

Stefan Sandberg
Product Owner Simulation, Veoneer Vision
This is Veoneer

• “Pure Play” focus on:
  - Safety Electronics,
  - Advanced Driving Assistance Systems (ADAS),
  - Collaborative and Automated Driving (AD).

• Founded in 2018, spin-off from Autoliv
• Close to 70 years of automotive safety development
• 7,100 employees in 13 countries
• Headquartered in Stockholm, Sweden
• Listed on the NYSE and the Stockholm NASDAQ OMX
Net Sales
2019: $1,902 million

Sales by Product
- Brake Systems: 20%
- Active Safety: 37%
- Restraint Control Systems: 43%

Sales by Region
- Europe: 23%
- Americas: 16%
- Asia: 11%
- Other: 10%

Sales by Customer
- Honda: 32%
- Ford: 13%
- Daimler: 11%
- COEMs: 10%
- HKMC: 7%
- RNM: 6%
- GM: 5%
- FCA: 4%
- BMW: 3%
- Volvo: 2%
- Other: 13%
A Tech Company Delivering Automotive Grade

- **6.5 million** Camera Sensors Delivered
- **>38 million** Radar Sensors Delivered
- **~830 million** Airbag ECUs and Crash Sensors Delivered

Delivered during the past decade, as Veoneer and as part of Autoliv
Our Technology Showcase
A Tech Company Committed to Creating Trust in Mobility

~500 Patent Families
where more than half are related to applications

~100 ADAS/AD test vehicles
collecting data and testing daily software updates

>15 Petabytes
of data used for Simulation
Simulation Area
Veoneer Vision
Simulation Area

- 80 people primarily in Linköping, Sweden and Timisoara, Rumania
- 13 teams
- 20 Data Collection Vehicles
- Delivered and supports close to a thousand data collection systems in-house and at customer sites
- Data storage and management
- Vehicle Integration shop
- Close to a thousand open loop HiL stations
- Delivery of components and Support to customer closed loop HiL stations
- Initial delivery of SiL solutions to customers
Where we were

- Few customer specific configurations
- Large data need
- Proprietary monolithic data collection system
- Large amount of open loop HiL stations
- Large amount of different tools developed by different teams with overlaps
- Dependent on in-house hardware solutions
Where we are

- Increasing amount of customer configurations
- Increasing data need
- Definition of harmonized and open DDS based standard architecture
  - Ramping up teams with new design approach
- Moving towards Limited amount of config-controlled components and reduced maintenance effort
- Investigating requirements on synthetic datasets
- Investigating strategic partnerships & procurements activities
Where we are going

- Open architecture and avoid vendor lock-in
- Reduced maintenance effort
- Standardized data model
- Reduced amount of HiL stations
- Large amount of testing in SiL environment
- Closed loop testing
- Synthetic datasets
- Identified strategic partners
- COTS hardware
RTI Connext in Play
Architecture Examples
Data Recording System

Data Writer

IMU

Time Server

Car Model

Sensor

Connectivity

Control GUI

Image Extractor

Victor

Vehicle Bus

Connext DDS Databus

Common Data Model
HiL/SiL Station (Open Loop)

- Data Reader
- Car Model
- Data Writer
- Control GUI
- Image Injector
- Victor
- Vehicle Bus
- Connext DDS Databus
- Common Data Model
Creating Trust in Mobility
Flawless Delivery
Customer-Centric Collaboration
Human-Centric Innovation

Thank You!