Industry standards for advanced vehicle data
Industry Trends

It’s amazing how much data is out there. The question is how do we put it in a form that’s usable?
~Bill Ford
“Modern” Cars

25 GB of data is created per hour of normal driving

1 – 4 terabytes of data per hour of driving

CAMERAS
20 – 40 MB Per Second

RADAR
10 – 100 KB Per Second

SONAR
10 – 100 KB Per Second

GPS
~ 50 KB Per Second

LIDAR
10 – 70 MB Per Second

Source: Intel

Growth

Incremental Improvements

Model T

1900

Today

2000

Autonomy Connectivity Electrification

2100

Autonomous Car

Global Data Insight & Analytics
One Connected Vehicle Contains

- 10k Trouble Codes
- 40 Warning Lights
- 10k Data Points
- 500+ Signals
- Deep Data
- ECU Internal Data

40+ Modules

Ford | Global Data Insight & Analytics
What Do We Consider Advanced?
With Proper Design, Legacy Vehicle Networks Can Handle Complex Data

Courtesy: Vector Informatick GmbH
Without significantly impacting RAM and ROM Size Constraints for Limited Compute Modules.
ECU Consolidation
Into a distributed central compute platform

Combined with improved compute performance through module consolidation

TODAY

• 60-100 ECUs
• 6-8 operating systems
• Isolated operations
• Increasing cost & complexity

Courtesy: QNX
The compute capability of Domain Consolidation Opens New Opportunities for Advanced Data Collection

TOMORROW

- 6-10 Domain/Area Mega-controllers
- Consolidated software system
- Coordinated operations
- Reduced weight, cost, & complexity

Courtesy: QNX
What Should Those Data Structures Look Like?

How do you scale them across industry?

How do we share insights with our supply base?
How do we scale into lower level modules?

How do we incorporate them across OEM’s?

Current Standards stop at basic Integer/float definitions
What Scripting tools and capabilities should we be using as an industry in an embedded environment?

- Python?
- Lua?
- Scala?

How do we manage safety and privacy regulations with scripting?
We aren’t waiting for a full industry consensus to derive value today.
Customer Listening Habits Drive Feature Development

Less than 2% of smart vehicle customers were using the Front Disc (CD Player) technology in 2018 when we decided to remove the feature from the vehicle. Our understanding of our customer’s feature utilization, benchmarked against third party market research confirmed we made the right decision.
Predictive Features and Smart Vehicles

We leverage our Smart Vehicles for pre-production optimization of features and functionalities we are delivering for our customer base.
Smart Vehicles at Scale

Our mandate for 100% connectivity is unlocking new opportunities for our customers. The density of data our smart vehicles generate is staggering.

It allows us to have a new agility around insights on what products we want to provide for each region, new opportunities for efficient logistics, and a re-Imagination of the relationship between a customer and its vehicle.
Advanced Data Schema Design

We’ve gone as far as defining our own embedded data sets and data schemas to accelerate the utilization of data for scalable decision making around feature utilization, warranty cost improvement, and better customer experience.

We recognize this only works if the data set reaches a significant market segment and economy of scale to support Tier I and Tier II needs as well.
These market trends offer us the opportunity to once again rethink the relationship between a customer, their vehicle, and the connected world around them.
Thank You

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