Fleet Telematics Data Recommendations

Using a standards-based approach to vehicle fleet telematics data to build a modern transportation ecosystem for all stakeholders.

October 2023
Agenda

1. The context:
   why commercial customers need consistent data to manage their vehicle fleets

2. The approach:
   An agreed “best practices” recommendation to be applied by the ecosystem

3. The benefits:
   Value added products, reduced integration efforts, value for all stakeholders
OEM Telematics

In near future, almost every new car will be “factory connected” and generate data!

Sources: ABI Research, Statista, McKinsey, …
OEM Data Ingestion

1. OEM data is transmitted wirelessly to the cloud.
2. The OEM data is processed using an API.
3. The processed data is sent to Geotab's cloud platform.
4. Geotab's myGEOTAB platform processes the data, providing a unified view.

ONE UNIFIED PLATFORM
Commercial Fleets Run on Data

As data drives their businesses, they have come to rely on and will increasingly require reliable, secure, high quality information platforms

Productivity
- Customer service times
- Identify unexpected stops
- Accurate arrival and departure times
- Optimized routes
- Reduce time waste and inefficiencies

Optimization
- Manage vehicle maintenance
- Proactively detect electrical and other issues
- Advanced diagnostic data

Safety
- Collision notifications
- Driver risk management
- In-vehicle coaching
- Track speeding
- Seat belt use
- Driving in reverse

Sustainability
- Increase fuel efficiency. Decrease Idle
- Track CO2 emissions
- Fleet electrification
- EV performance monitoring and reporting

Compliance
- Electronic driver logs
- Tax reporting
- Vehicle inspection reports DVIR

Expandability
- E.g.
- Winter operations
- Cold chain
- Video
- …
OEM Data - Coverage

Today, some of the key data points relevant to fleet management are often not collected by several OEMs. Here are some examples:

● Seat belt
● Acceleration
● Engine RPM
● Engine hours

**Goal**: Ensure that all OEMs provide access to all relevant data points
OEM Data - Quality

**Goal:** Ensure OEMs share the data with best in class precision and quality

**Speeding Exceptions**

- **06/05/20:**
  - 12:14:52: 44s
  - 1 km 54 Cranston Dr, Caledon East, ON L7C 1P6, Canada 74 km/h > 60 km/h
  - 12:21:06: 21s
  - 1 km 6 Simpson Rd, Bolton, ON L7E 1G9, Canada 63 km/h > 50 km/h
  - 13:41:08: 3m 4s
  - 3 km 14057 Airport Rd, Kleinburg, ON L7C 0R9, Canada 81 km/h > 60 km/h
  - 16:30:53: 22s
  - 0 km 15754 Airport Rd, Kleinburg, ON L0J, Canada 76 km/h > 60 km/h
  - 16:37:32: 38s
  - 1 km 7048 Peel Regional Rd 9, Bolton, ON L7C 0S3, Canada 88 km/h > 70 km/h
  - 16:40:43: 25s
  - 0 km 30 Humphersed Crescent, Caledon, ON L7E 2X3, Canada 76 km/h > 60 km/h
  - 16:45:42: 25s
  - 0 km 10 Simpson Rd, Bolton, ON L7E 1E4, Canada 61 km/h > 50 km/h

**Seatbelt Exceptions**

- **06/05/20:**
  - 13:41:26: 1m 15s
  - 2 km 14198 Peel Regional Rd 7, Kleinburg, ON L7C 2W5, C... 96 km/h > 80 km/h
  - 16:37:37: 31s
  - 1 km 7048 Peel Regional Rd 9, Bolton, ON L7C 0S3, Canada 83 km/h > 70 km/h

- **Seatbelt Exceptions: GO device**

- **Seatbelt Exceptions: OEM device**
The Issue: OEM data currently not suited for all use cases and different across OEMs

To make best possible use of the OEM data, it has to match customers expectation (in quantity and quality)

Available Data Points per OEM

<table>
<thead>
<tr>
<th>OEM</th>
<th>Available Data Points %</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEM A</td>
<td>83%</td>
</tr>
<tr>
<td>OEM B</td>
<td>78%</td>
</tr>
<tr>
<td>OEM C</td>
<td>68%</td>
</tr>
<tr>
<td>OEM D</td>
<td>42%</td>
</tr>
</tbody>
</table>

Available Rules & Reports per OEM

<table>
<thead>
<tr>
<th>Category</th>
<th>OEM A</th>
<th>OEM B</th>
<th>OEM C</th>
<th>OEM D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>36%</td>
<td>82%</td>
<td>88%</td>
<td>66%</td>
</tr>
<tr>
<td>Productivity</td>
<td>56%</td>
<td>56%</td>
<td>56%</td>
<td>56%</td>
</tr>
<tr>
<td>Fleet Optimization</td>
<td>68%</td>
<td>63%</td>
<td>63%</td>
<td>63%</td>
</tr>
<tr>
<td>Compliance</td>
<td>86%</td>
<td>86%</td>
<td>86%</td>
<td>86%</td>
</tr>
<tr>
<td>Sustainability</td>
<td>36%</td>
<td>36%</td>
<td>36%</td>
<td>36%</td>
</tr>
</tbody>
</table>

*Note: percentages not current, analysis as of 2022
Today: Not leveraging the value of data, but creating complexity with integration efforts

- Different types, makes, model, years - and data
- Multiple OEM and TSP clouds
- Multiple data users
So, What Does It Take? Three Things:

1. The right data from all OEMs
2. The right data from all OEMs in a common format
3. The right data from all OEMs with best in class precision and quality

The fleet telematics data recommendation and “standard” will help to achieve all three.
5 elements of the “recommended best practices”

1. **Sampling Methodology**
   - Curve logging (maximum error) vs fixed time

2. **Fleet Operational Data**
   - Modest set of specific vehicle signals and attributes including importance and preferred units

3. **Data Model**
   - COVESA / W3C Vehicle Signal Specification (VSS)

4. **Validation**
   - Support customers by ensuring that fleet data requirements can be met with certain vehicles

5. **Use Cases**
   - Productivity, Optimization, Safety, Sustainability, Compliance, Expandability
Example: U-Turn Detection

But the u-turn detected by Geotab on Go device indicates the u-turn was taken at the intersection.

While the OEM data misses the context because of unavailability of data for 30 seconds.
How Curve logging works

- Patented method of moving data efficiently from vehicle to server
- Key value-add: Data is analyzed on the server rather than algorithms in the device

More Info:
- How it works (blog post)
- Whiteboard video with Neil Cawse
- Curve Logging @ COVES
- Curve // Github

Curve logging can be implemented by OEMs on their embedded TCUs
Most needed Data Points, ~80 to start with

<table>
<thead>
<tr>
<th>Pillar</th>
<th>Use case #</th>
<th>Use Case</th>
<th>Data Point / Feature</th>
<th>Recommended Frequency / Data Reporting Logic</th>
<th>Importance*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SUSTAINABILITY05</td>
<td>- Identify opportunities for Fleet electrification</td>
<td>GPS</td>
<td>Ideal: smart/curve logic (<a href="https://github.com/Geotab/curve">https://github.com/Geotab/curve</a>) to detect significant change in speed and/or direction and send corresponding data points If smart logging isn’t available, 1 Hz</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>SUSTAINABILITY05</td>
<td>- Identify opportunities for Fleet electrification</td>
<td>Total fuel used (since activation) or Trip Fuel Used</td>
<td>every ignition event</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>SUSTAINABILITY06</td>
<td>- Ensure EVs are appropriately charged and fleets can run efficiently</td>
<td>EV battery charge % / state of charge (SOC)</td>
<td>ideal: every 1% change during driving and charging min: every 1 min during driving and every 2 min during charging</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>SUSTAINABILITY06</td>
<td>- Ensure EVs are appropriately charged and fleets can run efficiently</td>
<td>Range remaining</td>
<td>every 1 min during driving and every 2 min during charging</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>SUSTAINABILITY07</td>
<td>- Optimize charging costs based on zones</td>
<td>GPS</td>
<td>Ideal: smart/curve logic (<a href="https://github.com/Geotab/curve">https://github.com/Geotab/curve</a>) to detect significant change in speed and/or direction and send corresponding data points If smart logging isn’t available, 1 Hz</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>SUSTAINABILITY08</td>
<td>- Ensure EVs are appropriately charged and fleets can run efficiently</td>
<td>Charging Status (AC/DC)</td>
<td>logged at start of charge (charging AC or charging DC) and end of charging (not charging)</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>SUSTAINABILITY09</td>
<td>- Identify charging costs and optimize charging schedule</td>
<td>AC / DC charging energy in</td>
<td>every 2 min during charging</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>SUSTAINABILITY10</td>
<td>- Identify electric energy economy and real-world range</td>
<td>Driving energy out</td>
<td>every ignition event</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>SUSTAINABILITY10</td>
<td>- Identify electric energy economy and real-world range</td>
<td>Driving energy in (from regenerative braking)</td>
<td>every ignition event</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>SUSTAINABILITY10</td>
<td>- Identify electric energy economy and real-world range</td>
<td>Driving idle energy out</td>
<td>every ignition event</td>
<td>Must Have</td>
</tr>
</tbody>
</table>

*Source: Fleet Management Data Set, including Use Cases, frequency and Importance*
Proposal to use COVESA Vehicle Signal Specification (VSS)

The Vehicle Signal Specification (VSS) is an initiative by COVESA to define a syntax and a catalog for vehicle signals. In short this means that VSS introduces:

- A syntax for defining vehicle signals in a structured manner.
- A catalog of signals related to vehicles.

It focuses on vehicle signals, in the sense of classical attributes, sensors and actuators with the raw data communicated over vehicle buses.
There is more to come...

There is more to come...

TSP firmware on OEM hardware

- HW integrated in vehicle E/E architecture

Remote functions

- E.g. door lock / unlock, immobilizer, preheating, remote charging, charging presets, remote reset of headunit ..

processes

- Harmonized VIN eligibility and vehicles activation APIs + consent management

Fleet Data recommended best practices

1 - 5

The so far proposed recommendations address only some fundamental data issues, more can be done to improve the ecosystem this industry needs
“Agreed best practice” approach enables revenue generation, innovation and customer satisfaction

<table>
<thead>
<tr>
<th>OEM</th>
<th>Fleet Customer</th>
<th>TSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ collect and provide the right data for their customers’ needs, more efficiently (lower bandwidth and cloud storage)</td>
<td>✓ get access to similar data / frequency across brands</td>
<td>✓ more pertinent insights and services for (the whole) fleet with the right data</td>
</tr>
<tr>
<td>✓ Safeguard future vehicle sales (customers demand data)</td>
<td>✓ improve their productivity, safety, sustainability, regulatory compliance and grow their business</td>
<td>✓ Less investment in API integration</td>
</tr>
<tr>
<td>✓ lower product development and integration costs with standardized solutions</td>
<td>✓ Interoperability with other systems, beyond Fleet Telematics (e.g. ins, roadside assistance, fuel card, ...)</td>
<td>✓ New product creation based on easy shareable data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Easier support leads to better customer experience</td>
</tr>
</tbody>
</table>

easier for any prospective partner to join the ecosystem and to integrate with and consume data - robust data marketplace for all parties
What can you do now?

1. Inform yourself
   - OEM enabled Fleet Management Data Recommendations
   - defined set of specific vehicle signals

2. Contribute and provide feedback
   - COVESA Commercial Vehicle Birds of a Feather (BoF)
   - Provide feedback to the COVESA BoF or directly to Ted Guild <edwardguild@geotab.com>

3. Implement and endorse recommended best practice
Providing vehicle operators with easy, controlled, and standardized access to their vehicle data, builds trust with the fleet customer and at the same time provides advantages for vehicle manufacturers and owners alike. Only with the foundation of reliable standards can high-quality processes be implemented in a scalable manner.

Peter Hecker, Senior Expert Telematics, DB Regio (Bus)
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