

# **SMART STEEL – Engineer. Build. Connect.**

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Capital Markets Meet & Greet

SMART STEEL: SAF-HOLLAND Driving Tomorrow

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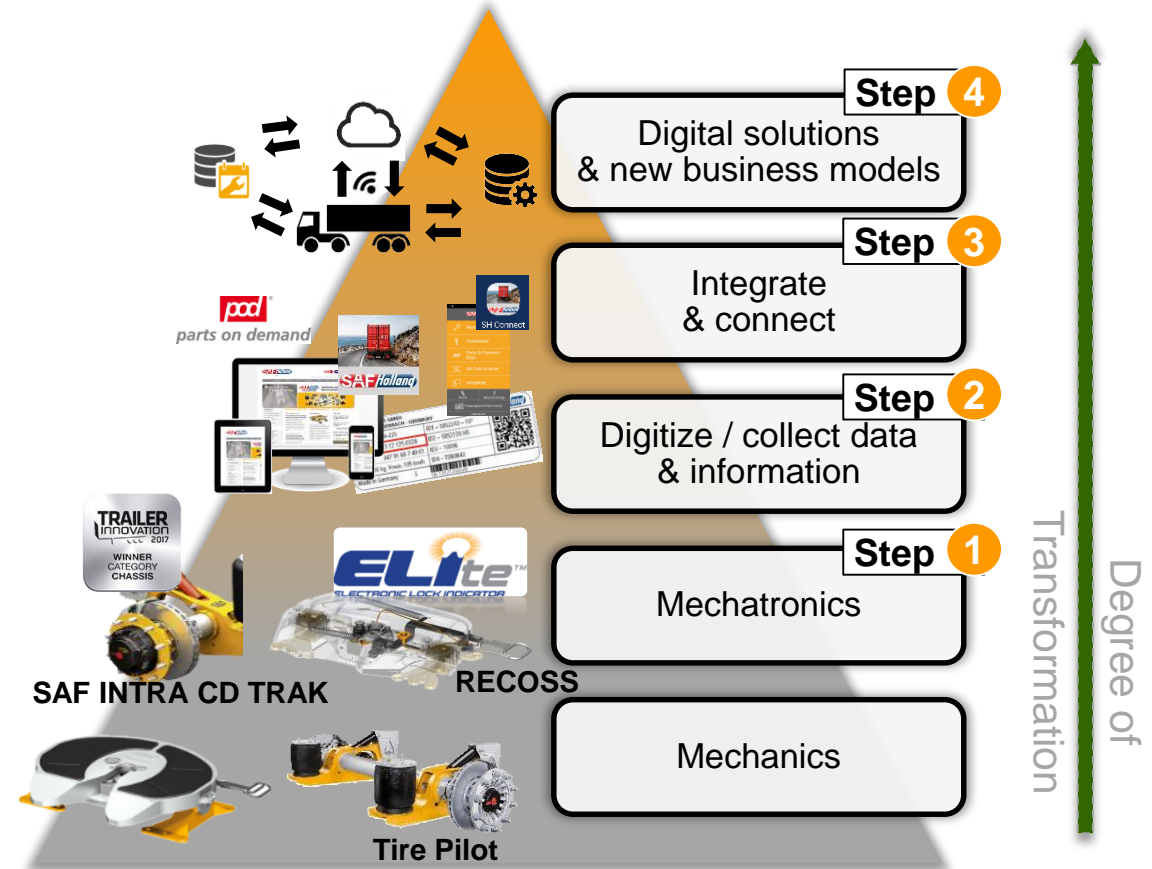
# SMART STEEL – SAF-HOLLAND’s Digital Strategy



## Our focus...

- Target 1: Support sales of “steel” products as much as possible
- Target 2: Create additional sales through “smart” products
- Target 3: Create additional sales through new business models

- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li>(1) Sensors &amp; telematics</li> <li>(2) E-axles</li> <li>(3) Automatic coupling systems</li> </ul>  | } | <ul style="list-style-type: none"> <li>• Safety</li> <li>• Alternative driving technologies</li> <li>• Automation</li> <li>• Autonomous driving</li> <li>• Reduction of costs (TCO)</li> <li>• Additional products</li> </ul>                   |
| <ul style="list-style-type: none"> <li>(4) Digital media management                     <ul style="list-style-type: none"> <li>• Web &amp; app</li> <li>• E-learning / tech. doc</li> <li>• AR / VR</li> <li>• Video</li> </ul> </li> <li>(5) E-commerce                     <ul style="list-style-type: none"> <li>• POD – Parts on Demand</li> <li>• CRM</li> <li>• Digital marketing</li> <li>• Services</li> </ul> </li> </ul> | } | <ul style="list-style-type: none"> <li>• Sales support</li> <li>• Safety</li> <li>• Maximizing uptime</li> <li>• Qualified personnel</li> <li>• Automation</li> <li>• Reduction of costs (TCO)</li> <li>• Additional revenue streams</li> </ul> |



## Our projects...

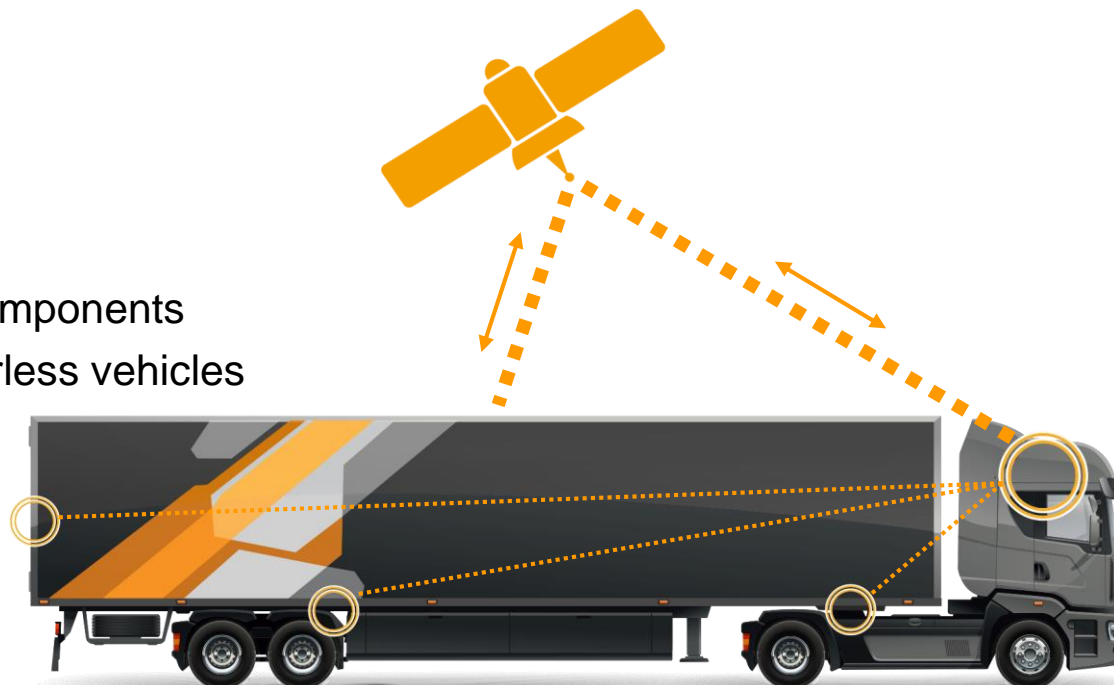
### Smart Trailer (telematics & sensors)

- Comfort functions
- Additional Information
- Safety critical status reports
- Real time health monitoring of all components
- Pays in to the overall target of driverless vehicles

#### General Info:

- Position landing gears
- GPS / position
- Load condition
- Door open / closed
- EBS Information
- ...

➔ **Over 100 years of unique know-how in axles, suspensions and fifth wheels**



#### Integration

- Display in cabin
- Smartphone / App
- Cloud connection
- IoT platforms
- Integration in existing systems and infrastructure
- ...

#### Axle and suspension:

- Tire pressure (Tire Pilot) & -temperature
- Pad wear
- ABS sensor
- Axle load
- Bearing temperature
- Brake temperature
- ...

#### Fifth Wheel:

- Coupling status (open/closed -RECOSS)
- Vertical load and load distribution
- Articulation angle
- Wear
- ...



## Axscend – TrailerMaster: A fresh approach

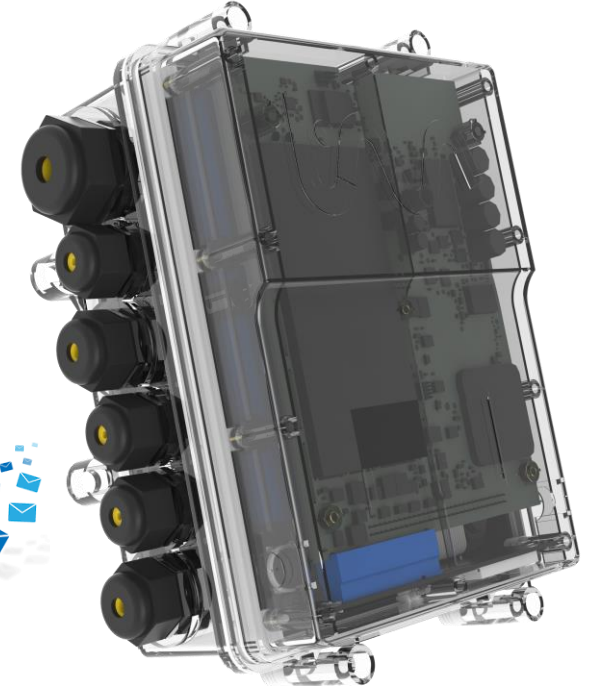
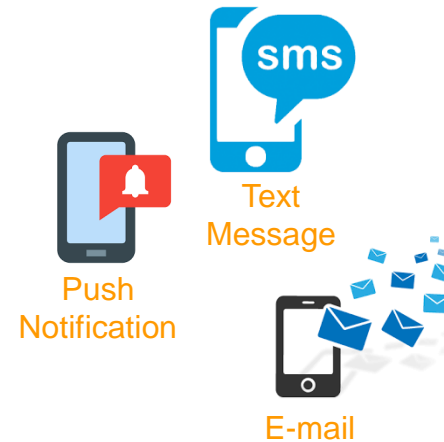
### Trailer state monitoring

- Lifts the hardware and the computing capacity to the next level
- Considers every piece of information entering the system
- Combines new information and existing information; offers user-defined rules based on algorithms
- Triggers actions through notifications, mobile messaging and E-mail

### Payment models

- Hardware sales
- Hardware sales & subscription upfront payment
- Hardware sales & monthly subscription payment

- ➔ **Introduces a new data-based, license business model**
- ➔ **Offers a scalable platform for a roll out on Group level**
- ➔ **Consolidation of Smart Trailer / Connect+ Projects and TrailerMaster will create additional value and synergies**

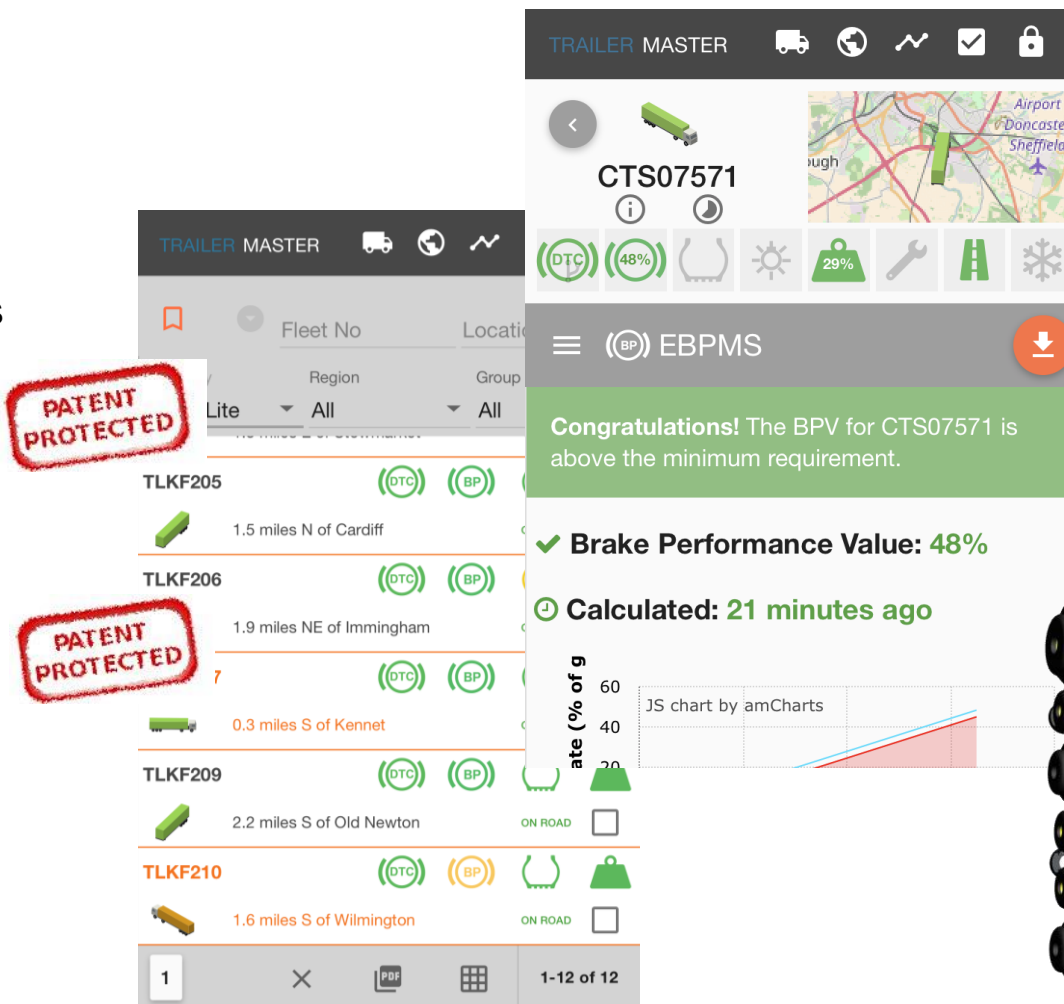


**Connects trailers  
to decision makers...**

## Axscend – TrailerMaster

### Features

- Easy docking
- Lamp current/ voltage monitoring
- Auxiliary battery monitoring
- Data comms over lighting circuits
- Trailer condition indicator
- Braking performance monitoring
- Uncoupled TPMS
- Side marker control
- Smartphone integration (BT)
- Bogie load (uncoupled)
- ISO1184, ISO3731 or ISO12098 distribution
- Odometer
- EBS fault codes
- TPMS
- GNSS location
- Refrigeration unit integration / monitoring



### Hardware

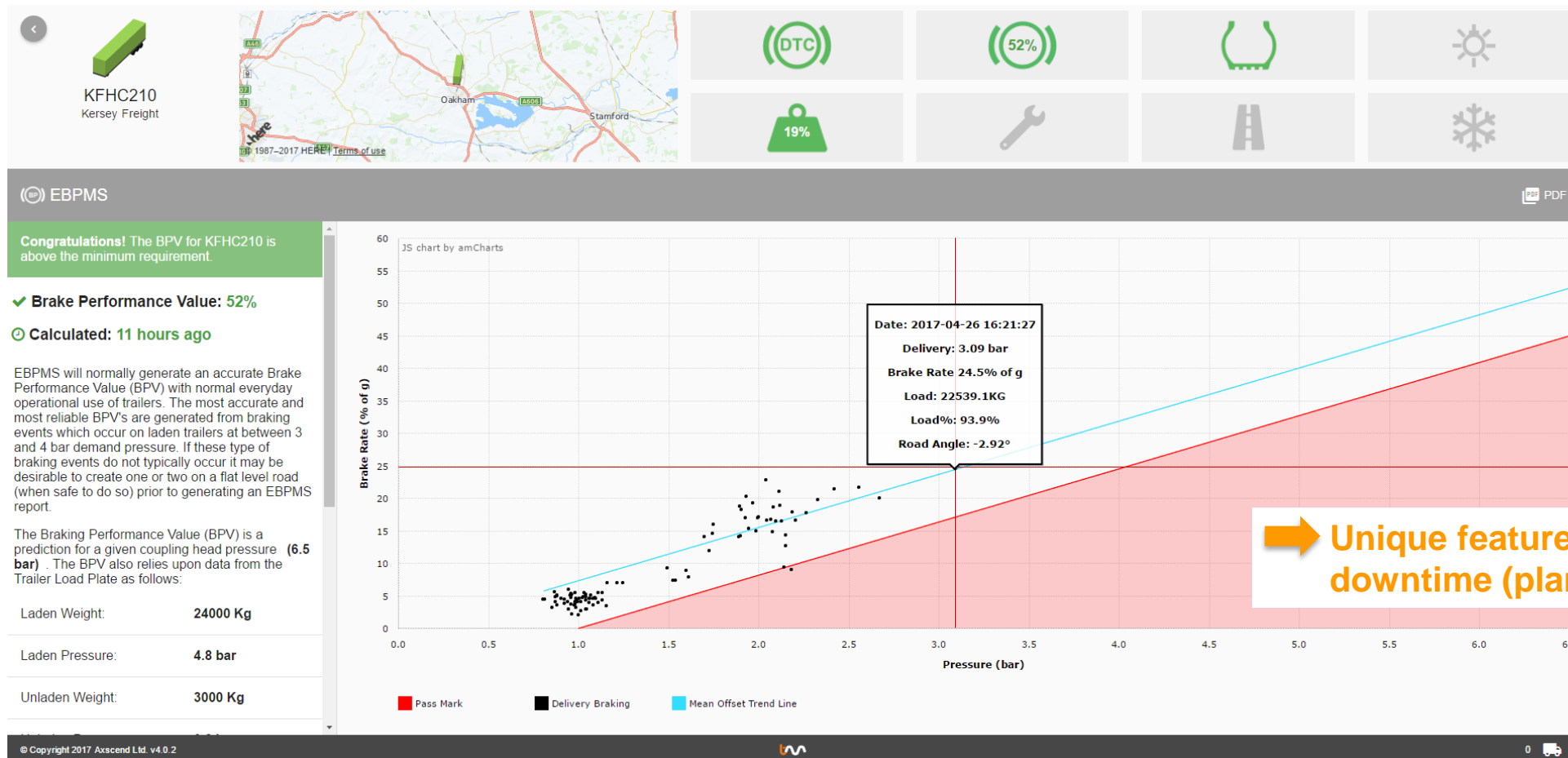
- Location technologies
- Supports Bluetooth 4.0
- 433 Mhz radio, supports tire pressure monitoring
- 40 Ah rechargeable battery capacity
- Removes complex and often unreliable wiring
- EBS CANbus integration



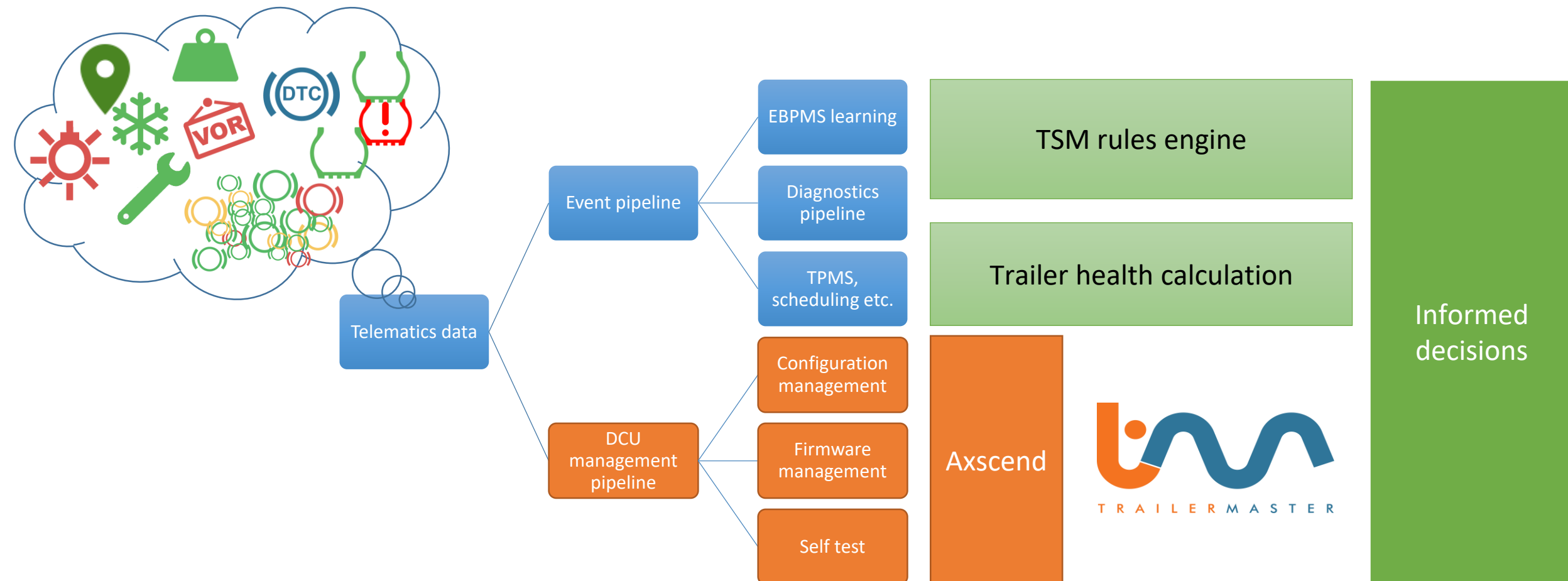
## Axscend – TrailerMaster

### Features

- Braking performance monitoring



## Axscend – TrailerMaster: Big data. Deep learning.



- Data received is fed into several analysis “pipelines”
- Each pipeline turns data into useful information.
- Fleet Operator can make “GO” / “NO GO” decisions.

## Our projects...

### E-axles

- New regulations and laws:
  - Reduction of CO<sub>2</sub>, NO<sub>x</sub> and noise standards for new heavy-duty vehicles (e.g. proposal for a regulation of the European parliament and of the council setting CO<sub>2</sub> emission performance, May 17, 2018)
  - Reduction of fuel consumption (commercial factor)
- E-mobility will change the transport industry significantly and sustainably
  - Recuperation and storage of electric energy for all consumers in vehicle
  - Hybrid vehicles
  - Full electric vehicles

## Reducing CO2 emissions from heavy-duty vehicles

[Policy](#)

[Documentation](#)

[Studies](#)

Lorries, buses and coaches produce around a quarter of CO<sub>2</sub> emissions from road transport in the EU and around 6% of the EU's total CO<sub>2</sub> emissions. Action is needed to curb these emissions.

On 17 May 2018, the European Commission presented a legislative proposal setting the first ever CO<sub>2</sub> emission standards for heavy-duty vehicles in the EU.

The proposed targets for average CO<sub>2</sub> emissions from new lorries:

- In 2025, 15% lower than in 2019
- In 2030, at least 30 % lower than in 2019 (indicative target, subject to review in 2022)

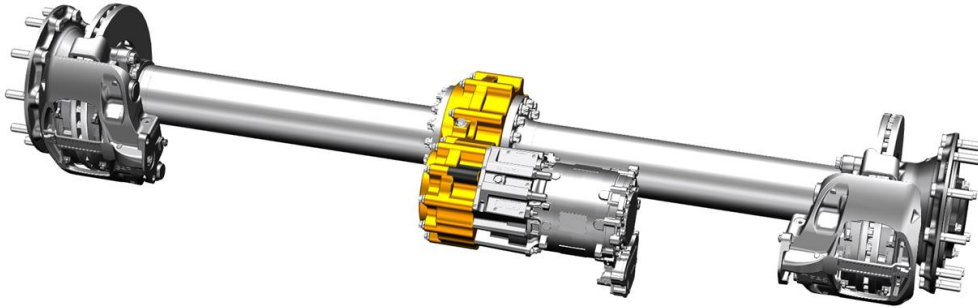
The proposal also includes a mechanism to incentivise the uptake of zero- and low-emission vehicles, in a technology-neutral way.

Source: [https://ec.europa.eu/clima/policies/transport/vehicles/heavy\\_en](https://ec.europa.eu/clima/policies/transport/vehicles/heavy_en)



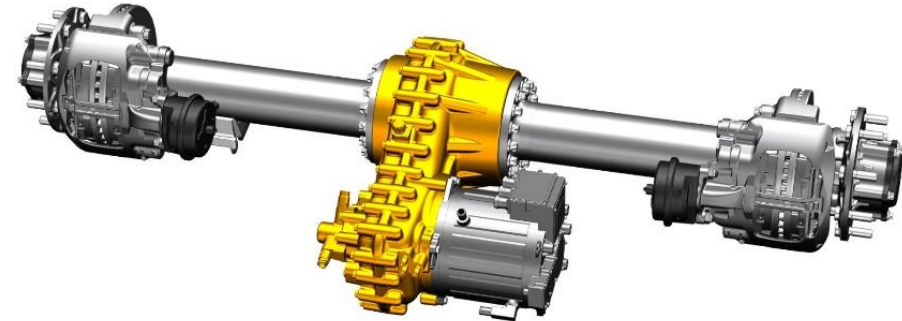
## Our projects...

### E-axles



#### TRAK<sub>r</sub> for Recuperation

- Ratio i: 13
- Max. power: ~50 kW
- Motor type: ASM (Asynchron Machine or PSM / Internal rotor / liquid cooled



#### TRAK<sub>e</sub> for Recuperation and Drive

- Ratio i: 13
- Max. power: 147 kW
- Max. moment: 350 Nm ► 2.275 Nm on the wheel
- Motor type: PSM (permanent magnet) / internal rotor / liquid cooled



Developing an axle family that can be combined with a wide range of wheel ends (EU, NA, CN,...) and suspensions (Intra, Modul, CBX,...) of SAF-HOLLAND

## Our projects...

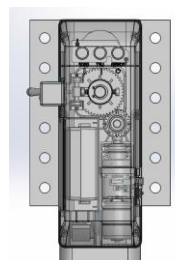
### Automatic coupling systems

- Comfort function
- Increased safety and reliability
- Improved efficiency (safe time and more coupling procedures) leads to reduction of cost and down time
- Pays in to the overall target of driverless vehicles

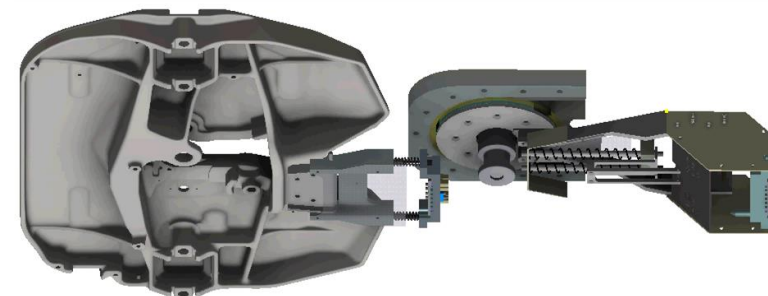
- Additional functions like
- Adaption of ride height and mounting height (for coupling procedure, air suspension)
- Health monitoring and maintenance information



- HMI display
- ECU controller
- Software



- Automatic landing gear



- Remote controlled and sensed fifth wheel
- Connector for air, controls and power (ECE R13 - Pin to Pin)



Enables automated driving;



Significant potential for structural growth though increased content per Vehicle;

## Our projects...

### Digital media management

- Technology from mass market (B2C applications) now broadly available for industrial applications (B2B)
- Service, support and training changes in correlation with the behavior of the user (smartphones, Google, YouTube,...)

➔ **Any info, any channel, any place, any time**

➔ **Drives Aftermarket growth and introduces new paid services**

### Technologies

- Augmented and virtual reality
- Utility videos
- E-learning (LMS - Learning Management System)
- Voice control
- QR codes

### Content

- Product information
- Trainings
- Guided and remote repair
- Parts identification and orders
- Diagnostics routine
- Service and warranty handling

### Channels

- Web (html) / App
- POD – Parts on Demand
- Data glasses / wearables
- Computers, smartphones and tablets
- On site (trainings & service)
- Webinars
- Print / PDF

**Your questions are welcome!**