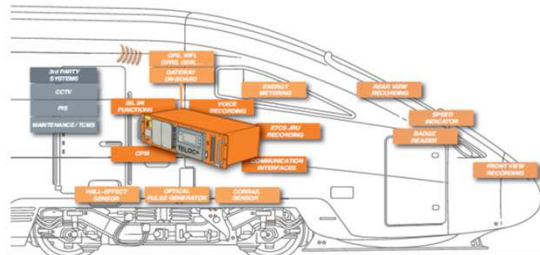


### 1. Telocs: Data recorders



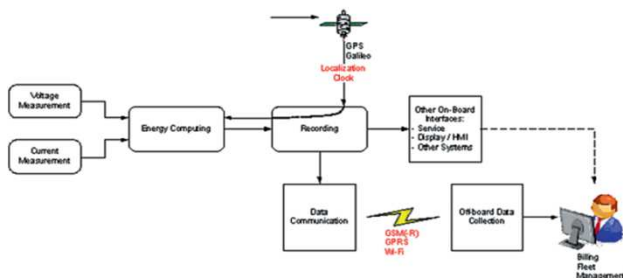
### 2. Safety monitoring equipment



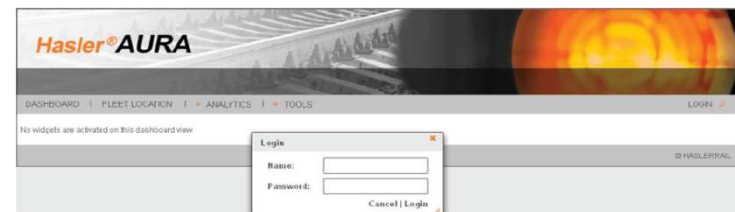
### 3. Safety systems up to SIL 4



### 4. Energy metering Systems



### 5. Aura: centralised fleet information evaluation





☐ ETCS compatible

☐ SIL 2 up to SIL 4

☐ New TELOC 3000



TELOC®3000 19-inch version



TELOC 3000 Specs

## TELOC®1200



The TELOC®1200 will mostly be used for applications in refurbishment projects of existing Hasler® RT or MEMOTEL-units as well as in new LRV or urban mass-transit vehicles.

Thanks to its compact sizes, it will easily find its place in today's fully-laden engine rooms or driver's cabins.

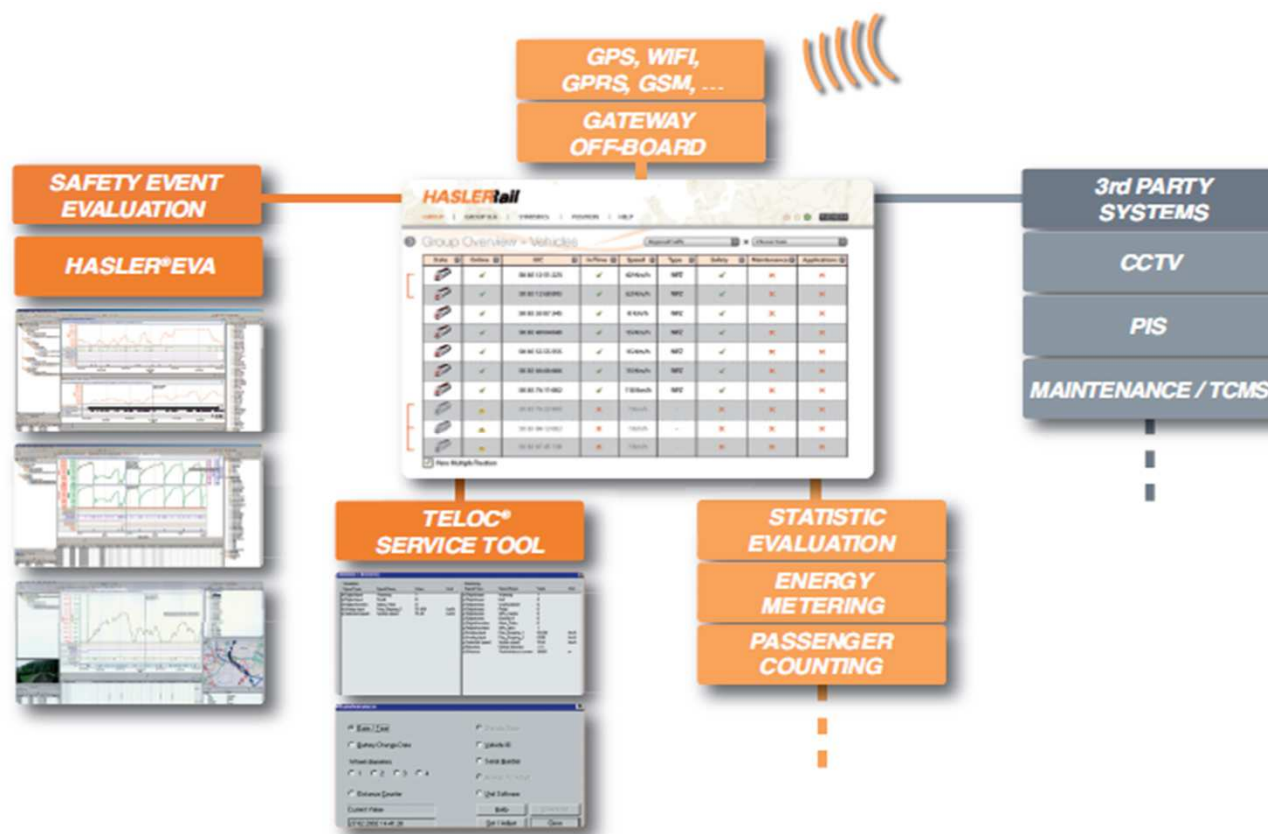
There is one major difference between the TELOC®1200 and the other units: unlike the TELOC®1500 or 2500 which can both be individually customised, the TELOC®1200 is a standard device when it comes to hardware, e.g. it can only be adapted to customer needs using the software configuration.

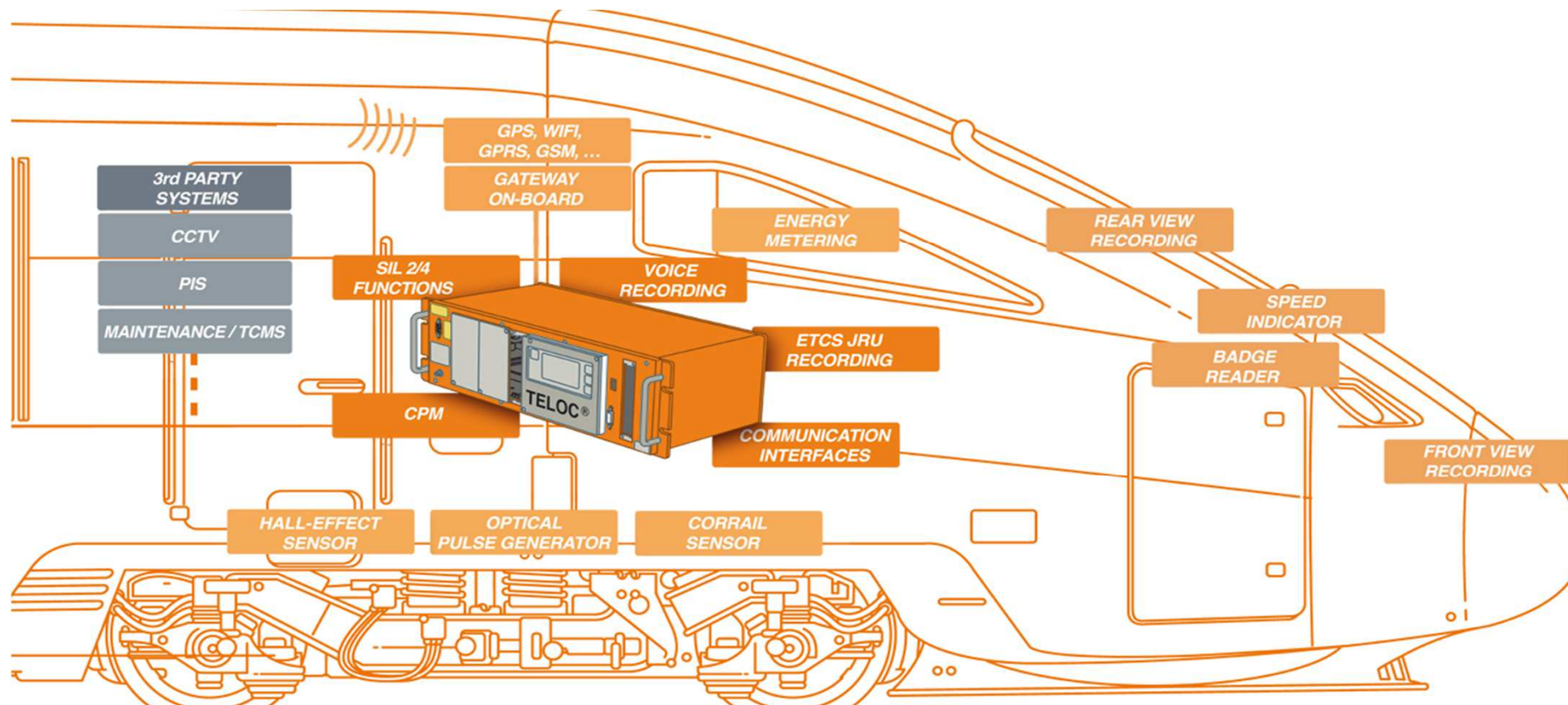
Nevertheless, the unit fulfils all desirable basic operations and can be linked to the vehicle logics using a bus-system such as MVB, CANOpen or any other RS485 link.

- ❑ Standard hardware
- ❑ Customizable software
- ❑ Designed for light rail



- Teloc offers a central analysis of all related data in one vehicle





**Hasler® SPEEDO**



**CORRail 1000**



**Safety Systems**





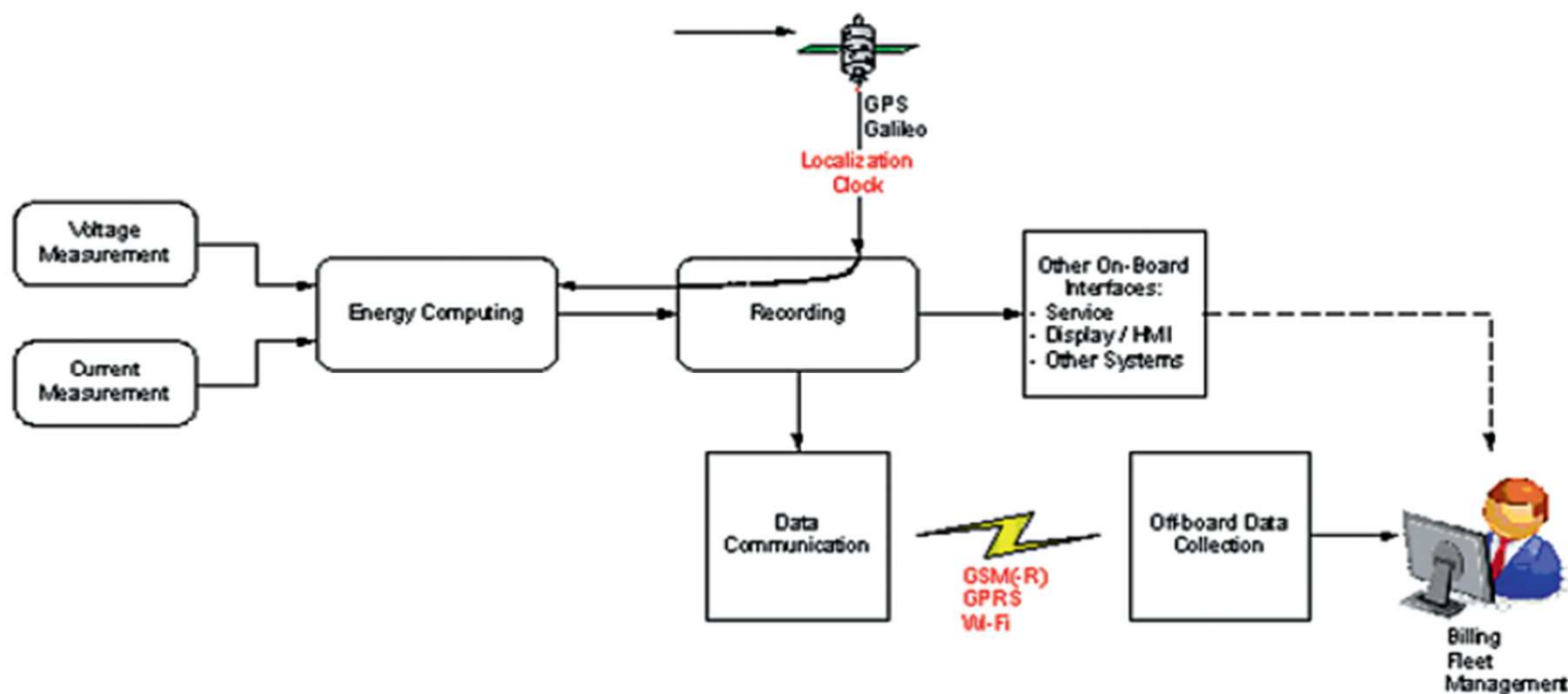


Using SABOA, we are able to achieve SIL approval up to SIL4 for the following functions:

- **Roll-Protection:** Monitors unwanted vehicle roll-away. If a roll-away motion is detected, the brakes are applied. **SIL4**
- **Rollback Protection:** Operation direction monitoring, if a wrong direction is detected, the brakes are applied. **SIL4**
- **Driver Safety Device:** Driver monitoring (also called dead-man control, SIFA or VACMA). If the driver lacks vigilance, the brakes are applied. This function meets the requirements of RFI36:2002 and UIC 641 if configured correctly. **SIL4**
- **Speed Thresholds:** Vehicle speed monitoring, if the speed exceeds a predefined value during a predefined period, the brakes are applied. This function is useful for Metros and Mountain Railways. **SIL4**
- **Zero Speed Detection:** Vehicle speed monitoring. If the vehicle comes to a halt, the signal to open the doors is activated. **SIL2**
- **Speed Indicator Check:** Speed indicator monitoring. A predefined deviation between the present vehicle speed and the indicated speed triggers an application of the brakes. **SIL2**
- **Safe Speed Transmission:** A safe speed can be transmitted by a bus system as an input for other safety applications. **SIL2**
- **Emergency Brake Bypass:** Bypasses the passenger emergency brake outside of stations in order to avoid unwanted stops in a tunnel or on bridges. **SIL2**
- **Emergency Brake Supervision:** Supervision of the emergency brake curve. In case the emergency stop does not lead to deceleration of the speed according to a predefined brake curve, an "urgency brake" is activated. **SIL3**

### Evaluation and analysis

Thanks to the already existing TELOC®EVA2 software tool from HaslerRail it is possible to analyse all kind of train data including the energy data and to correlate them with data as like as GPS position, infrastructure owner, actual speed, traction or brake information, etc.





The application of a Vehicle Energy Metering system is multiple and covers the requirements in terms of:

- Invoicing of power consumed by operators
- Better management and use of required energy for rolling stock such as evaluation of saving potential, consumption monitoring, driver training, etc

### A complete solution

From the power measurement up to the analysis, HaslerRail AG offers a complete solution consisting of voltage / current acquisitions, energy computing and recording, data transmission, collection and evaluation.

Such a system fulfils the requirement of the new European directive 2008/57/EC, annex II, section 2.2. (subsystem "energy"). According to the technical specification for interoperability TSI 2008/232/CE, section 4.2.8.3.5., "If energy consumption measuring devices are to be installed on board trains, one device shall be used which shall be able to function in all Member States".

### Power measurement

Power measurement has to be carried out by line voltage and current transducers. Independent or combined transducers can be used. Values from transducers are transmitted as analogue signals to the energy computing system. In a combined

solution it is also possible to integrate the electronic computing the energy directly from the voltage and current measurement values.

### Energy computing

Combined system including transducers and electronic computing is an "all-in-one" solution allowing direct energy calculation. The calculated value is then transmitted to the data recorder system through a serial link.

For independent system the calculation of the energy will be realised through another system (for example Energy Meter EM4T from LEM) or directly through the data recorder. From the separate energy meter a serial link has to be used to the data recorder.

### Recording

Thanks to the TELOC® data recorder system from HaslerRail already used for train, ATP and signalling data collection it is not necessary to add another data recorder in the vehicle.

GPS connection (and in the future Galileo connection) to the TELOC® allows to stamp the date & time with high precision on each energy data recording. Further the GPS localisation can also be recorded on each data frame.

The advantage of the system is to link directly many train data like as actual speed with the energy data giving a broad range of possibilities by data analysis.

## That's Where We Are Today...

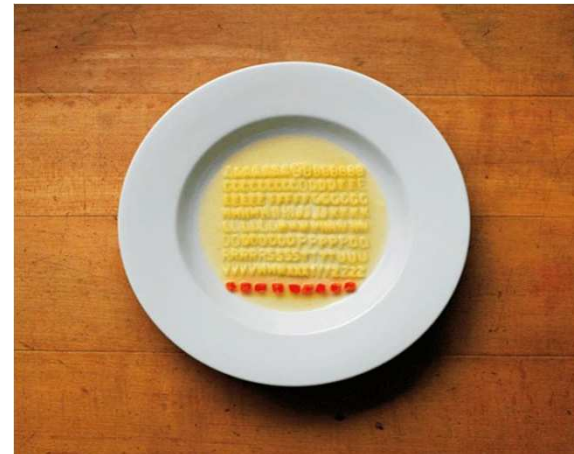
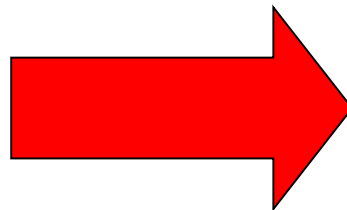
- Recorded data mainly used for 'post-mortem' analysis of accidents / incidents
- EVA focuses on data visualization
- Creating relevant information
  - Is a recurring and manual activity
  - Requires training and specific domain knowledge

## Enabling Advanced Information Services

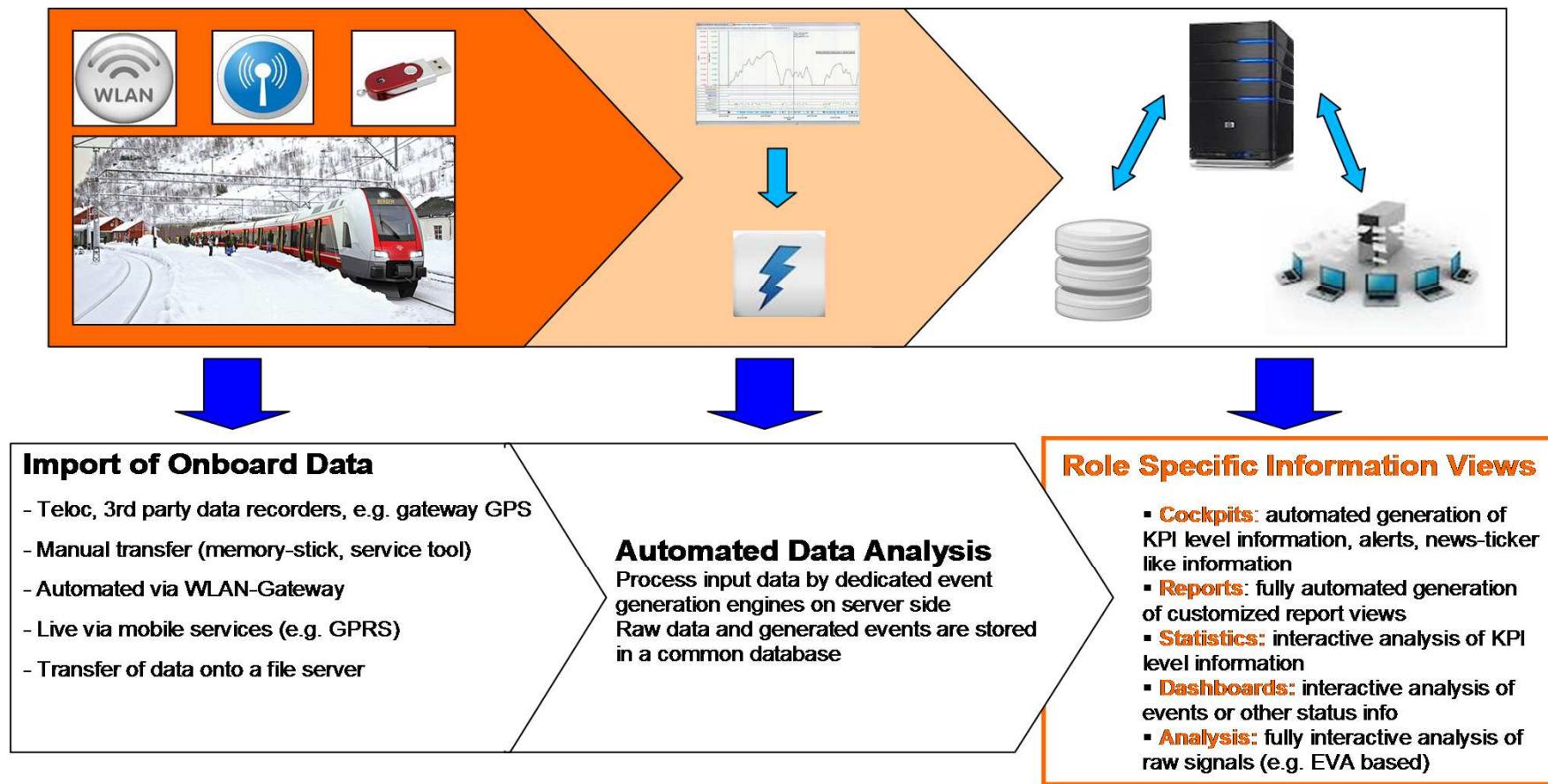
- Automate the process of generating information out of recorded or live vehicle data
- Provide role specific information views pin-pointing to relevant information only



Let's sort the "data soup" ...



- Aura is a software which compiles selected data from a fleet of vehicles



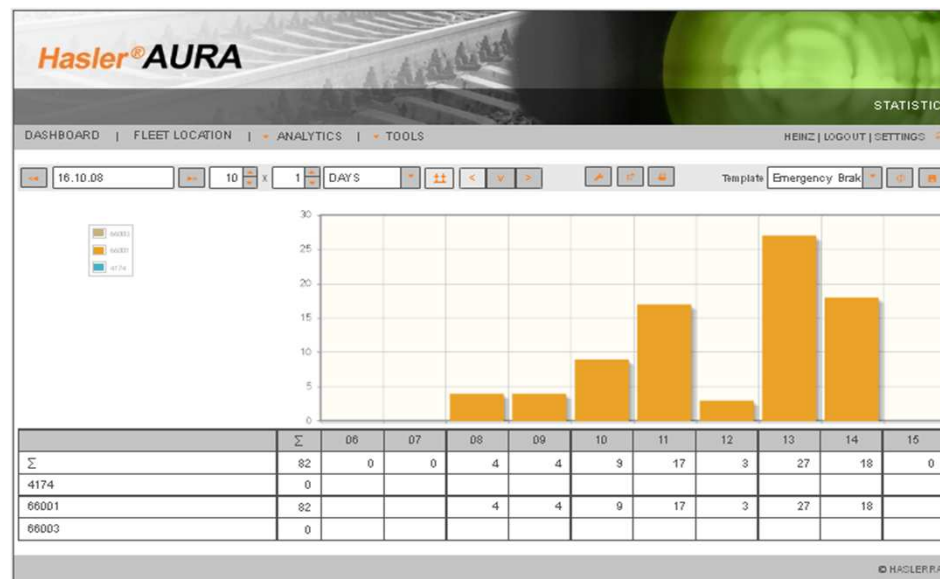
## What is the problem you want to solve?

- AURA extracts the event types and KPIs of the imported recorder data that are of relevance to the specific problem domain
- AURA provides specific Dashboards, analytic views and reports to visualise the extracted information at the right level and in an intuitive way
- This is what we call APP...

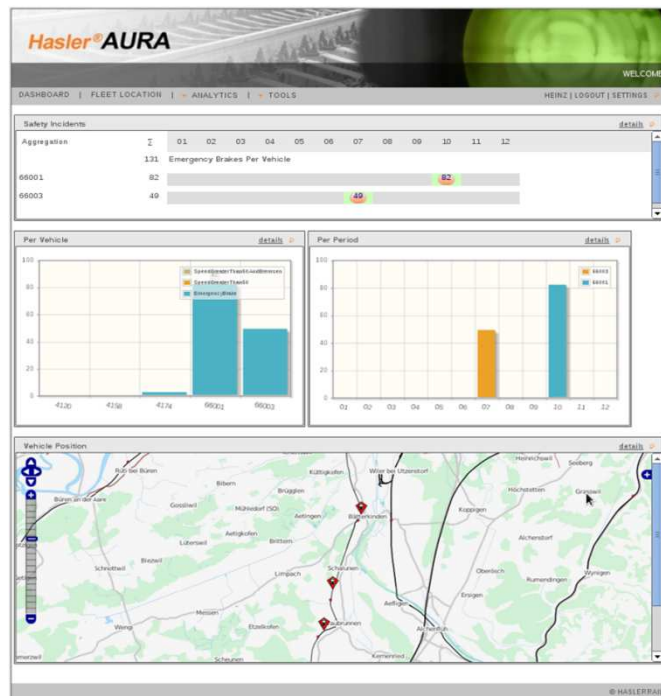


## ONE App for one problem...

- AURA Apps solve common challenges, (e.g. detection of safety incidents), but may also respond to very specific challenges within your organization



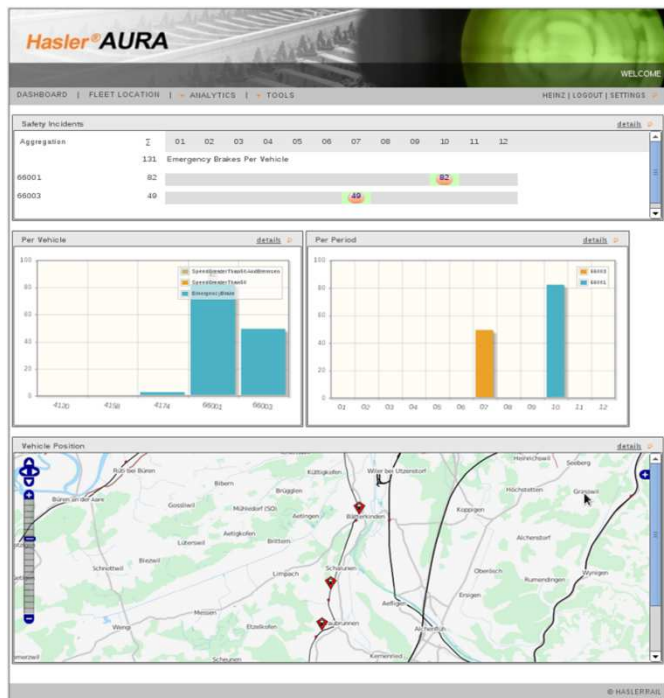
## What is the App you need?



### Safety App

Find and visualize safety critical events within the recorded data of your vehicles

## What is the App you need?

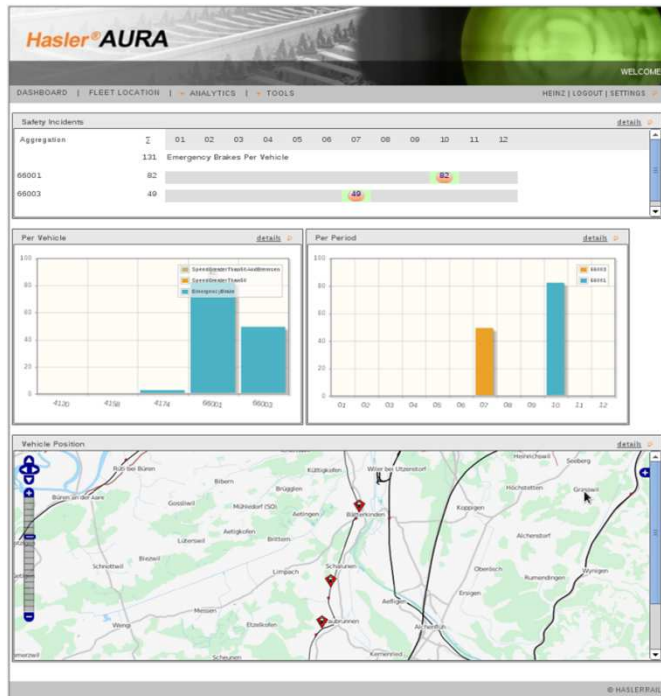


# Fleet Location App

# Locate and track the vehicles of your fleets



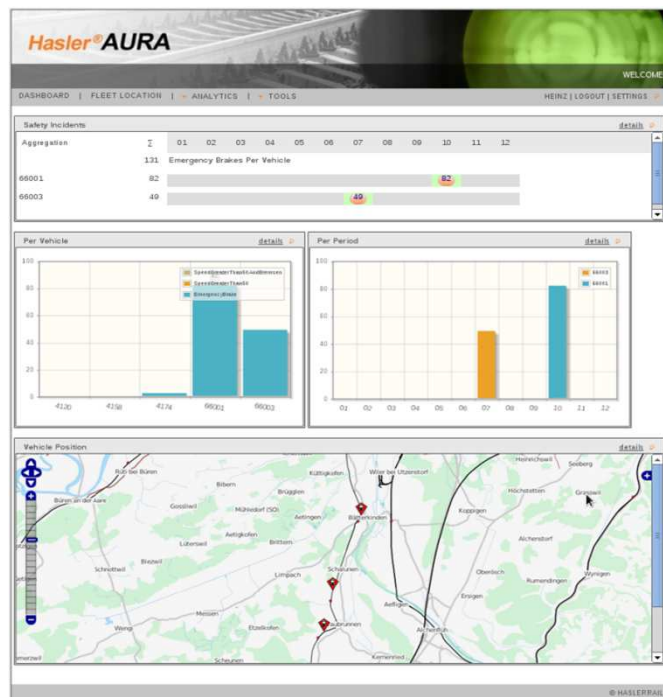
# What is the App you need?



## Availability App

Generate KPIs for each of your vehicles that help optimizing your service intervals

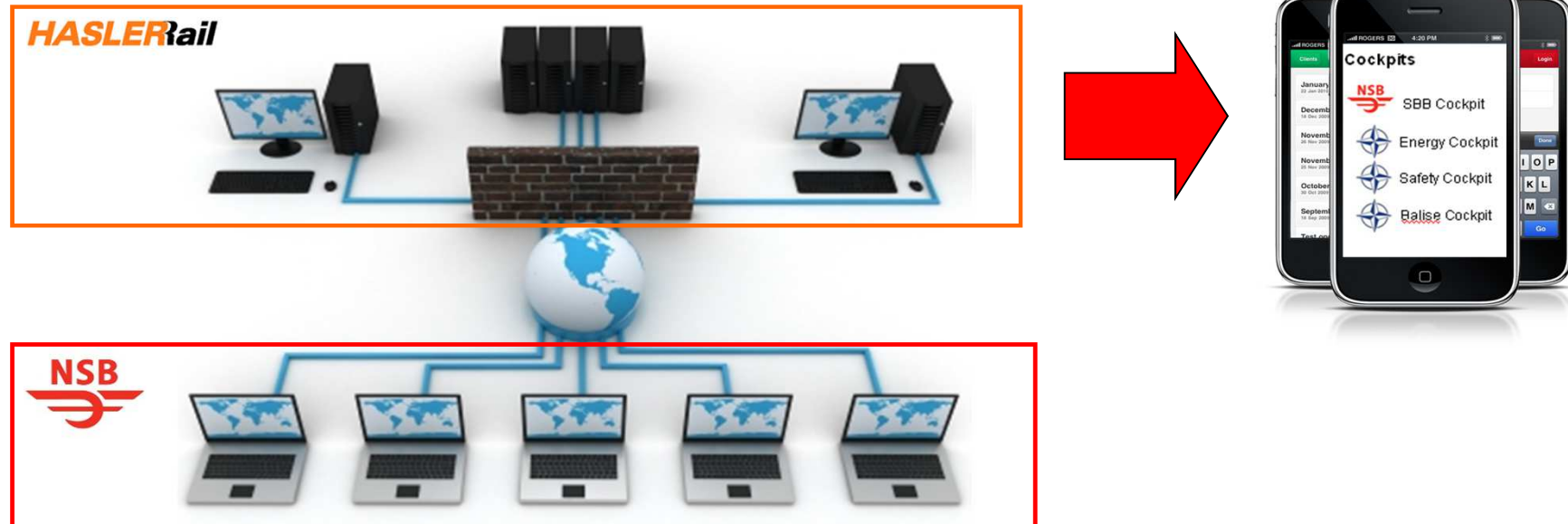
## What is the App you need?



## Driver Performance App

Measure the individual driver performance with respect to organisation specific rules

## Multiple Deployment Scenarios Supported by Software Platform



### Central Hosting Installation

- AURA runs within Haslerrail's application server environment
- On client side all information views run within a standard web-browser (i.e. Internet Explorer, Firefox, or Safari) that connects via Internet to the Haslerrail application server
- No specific installation on client PC required



- **SAFETY:** OVERSPEED & ACCIDENT by DRIVER...?
- **MONITORING & REPORTS:** ENERGY CONSUMPTION → Reasons...?
- **EFFICIENCY (ALERTS):** BALISE DETECTION (ETCS)..?
- **MONITORING & REPORTS:** DOORS → Reasons...?

→ What are your specific **Hasler®** AURA requirements?