

Ruter # Passenger Counting Management System



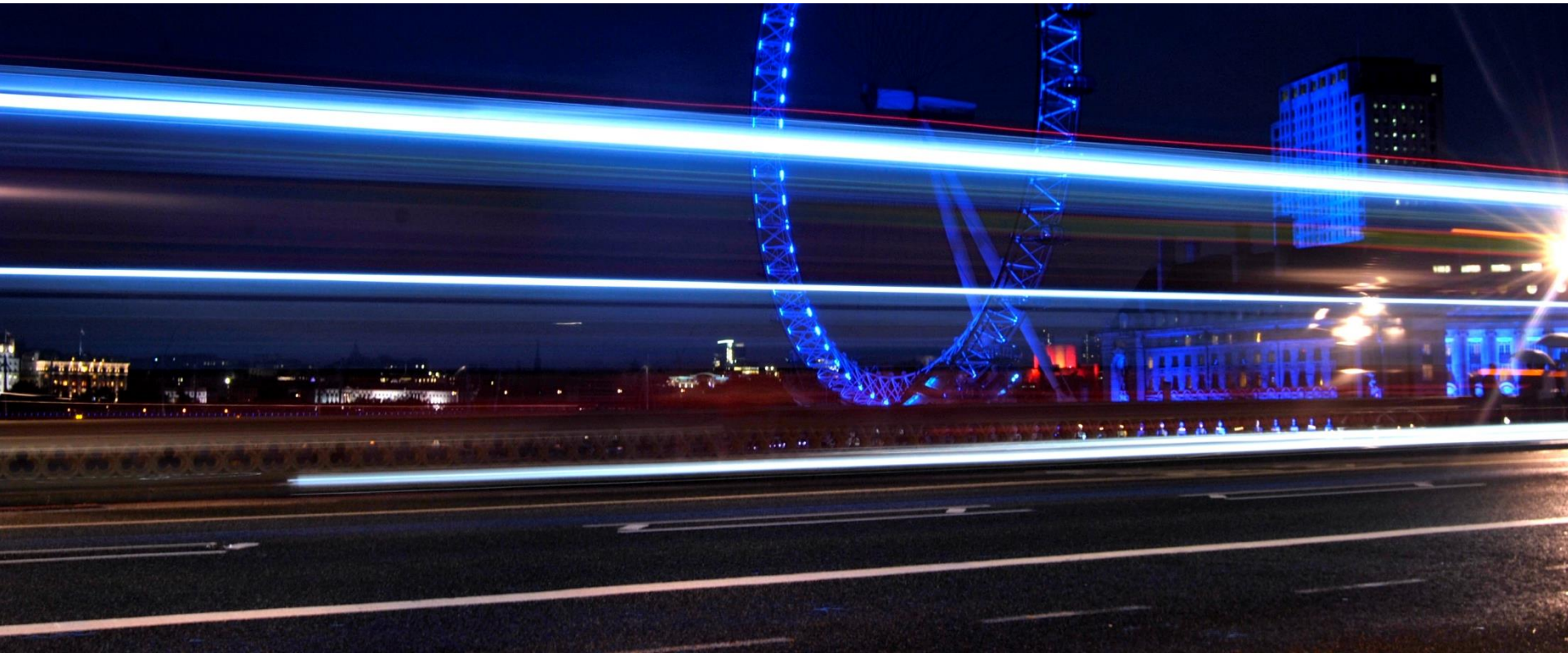
How should Ruter move forward in order to achieve an future model open to European standards....



Open platform – Linux

- Use opensource platform give proven modular flexibility for the future.
- Opensource is better at adhering to open standards give no licences and have great flexibility on interfaces .
- Have a system that is certified and can integrate and forward all data.
- Data evaluation under i.e. SAP for a quick overview and as a basis for detailed analysis
- Archiving of raw data under i.e. SAP as a basis for further evaluation incorporating existing software tools.
- To handle scheduling data as well as Geographical data
- Give the approach to integrate the service and maintenance issues in combination with daily duty of the fleet, drivers performance, bus performance, traffic data, traffic lights to enable the controlling of the fleet – ahead the restriction of e.g. the standardized FMS interface

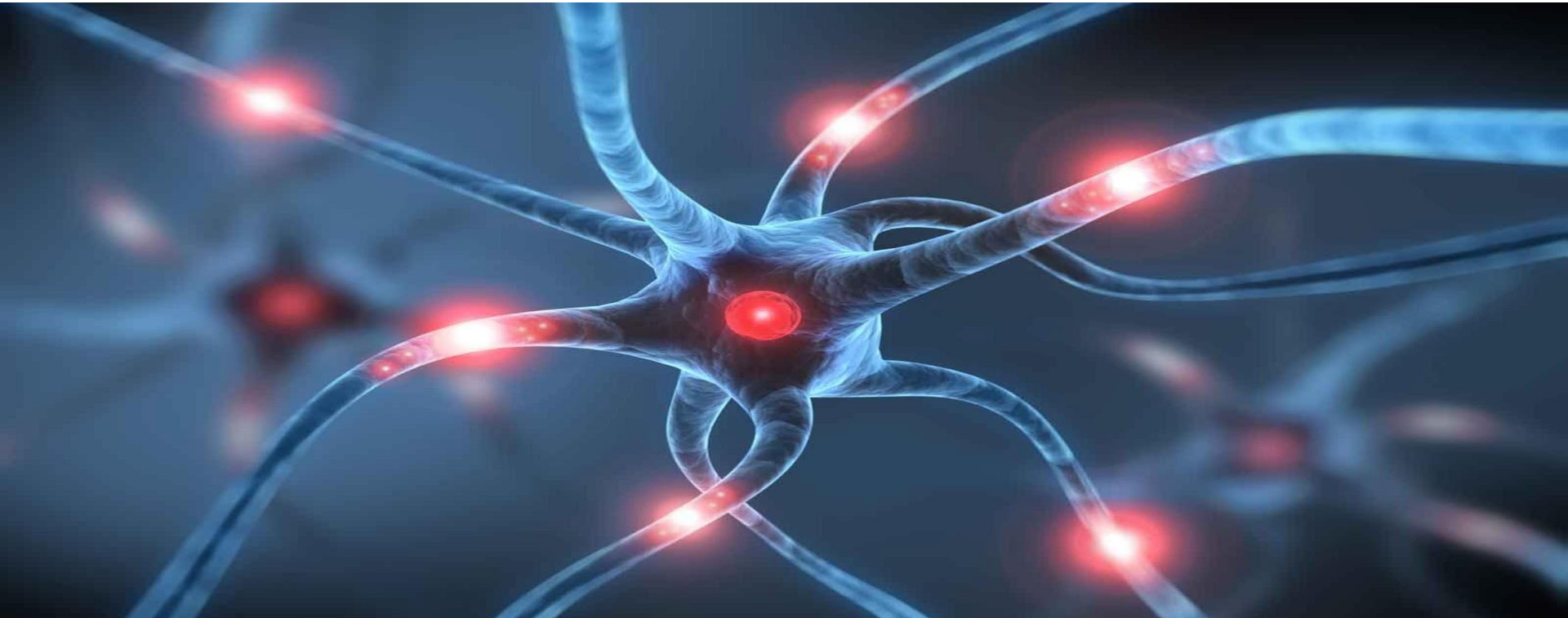
What considerations are important to make regarding the acquisition of a future-oriented solution...



Better and more reliable counting data

- The system should be modular and expandable.
- The datafiles should be in an open format such as XML, CSV etc...
- VIN nr should be delivered by the Vehicle system
- Diagnostics and error handling shall be provided by the supplier as well as having surveillance on all vehicles units.
- The vehicle system should be able to access and make diagnostics on CAN beyond the bus FMS interface. Diagnostic data can be accessed at any time and early discovery and automated registration of faults.
- Detailed MTBF long term analysis.

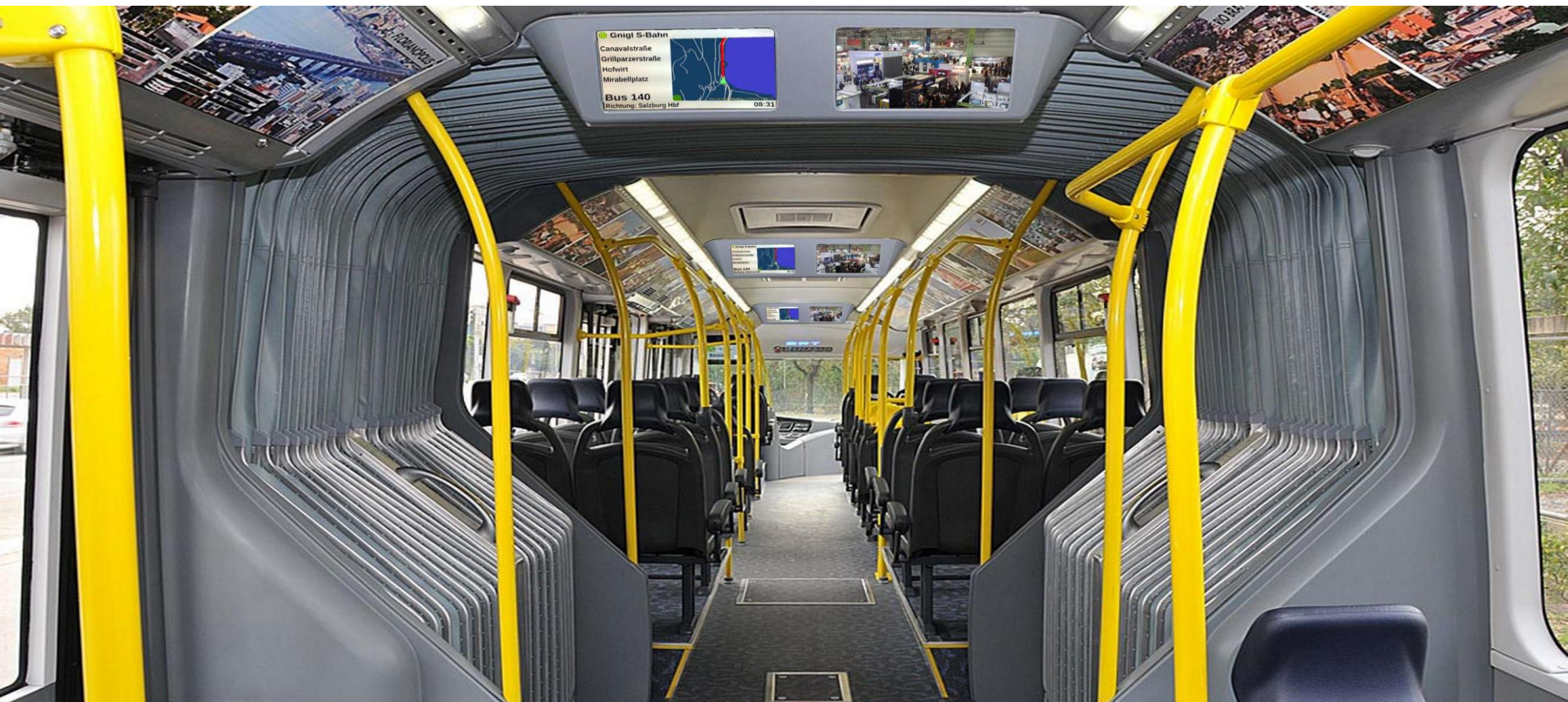
What different solutions and delivery models for APC should be considered...



Solution and delivery models...

- The contract for APC could be separated into two parts, one for vehicle equipment and one for backend data collection, processing and reporting.
- A test phase for each of the mentioned parts could be done.
- A frame contract that cover the full scope of delivery is however preferred model and will allow the project to be harmonized in a step by step customized solution with less restrictions for both the supplier and the end costumer.
- The supplier is responsible for vehicle surveys before installation in order to secure that the proposed technical solution is valid and all needed signals (i.e. CAN access, door open etc...) are available and if not the supplier shall present an alternative solution.
- An onboard communication platform (existing infrastructure) is present at Ruter vehicles and should be considered so that less extra equipment will be needed and provide necessary interfaces.
- The supplier shall, in co-operation with the supplier of existing infrastructure, solve any integration issues regarding APC raw data transport, import and integration.

How can Ruter utilize counting data as a customer information element?



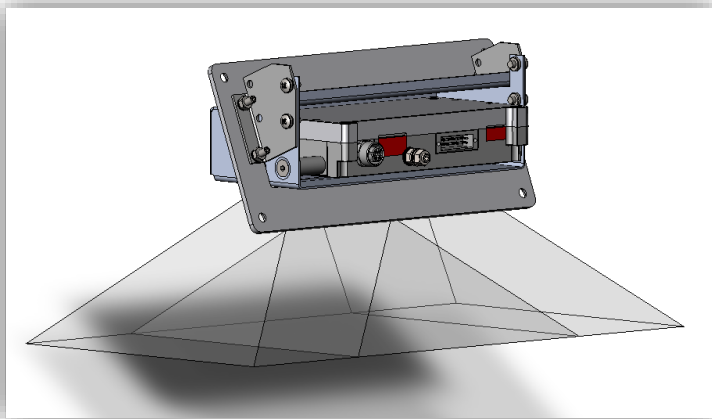
Counting data as a customer information element.

- Ruter can utilize the system in their daily work by comparing the actual driven Routes with the scheduled.
- Deviations and failures in the traffic can be visualized in seconds, this saves time and makes decision making easier and more effective.
- Tracking faulty units and automated filtering of bad data which contributes to cost savings, time saving and results in better planning of vehicles and drivers.
- The possibility to use the Passenger related data in combination with voice announcement, alarm or realtime info to the stops such as bus is full, half full etc.. is other areas where you can make usage of the same system.

Ruter # Should focus on a supplier that possesses:

- Analysis on long-term ridership.
- Save costs and resources by knowing the real traffic situation.
- Having statistical data over peaks and other factors.
- Long time experience in the integration of systems for public transportation
- Modular platform and unique capabilities of integrations, such as CAN, Diagnostics, Gearbox integrations
- Reference from similar or other high demanding projects.
- Step by step development together with the customer
- An APC System based on 3D Stereovision Sensor so that you in real-time can get the report of accuracy and in the same time check the video file from the sensor if the accuracy is correct

Hella Aglaia - The reliable supplier for passenger counting sensors



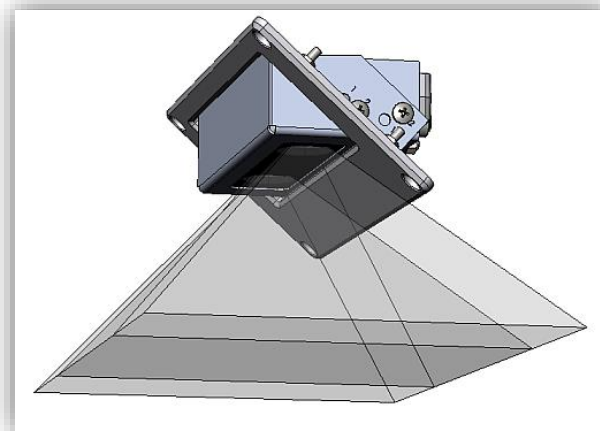
HELLA Automatic People Counter

A 3D Stereovision Sensor that offers:

- Highly accurate counting (98%)
- Wide area coverage
- Easy installation and setup
- No additional software required
- Video recording and streaming
- Confirms with VDV457
- All relevant certifications (for Bus and Train applications)
- Multiple Interfaces:
 - Ethernet, RS-485, J1708
 - VDV 300, VDV 301, J1587, IBIS WAGENBUS, SOAP XML, (S)FTP

- One Sensor per door
- Flexible mounting area
- Self diagnostics onboard
- Universal mounting kits available
- Additive functions possible

- Suitable for all board computers
- Our application team assists our customers worldwide



AB THOREB - The reliable supplier for passenger counting systems

Evaluation of APC



- System-level ridership from sample data in the presence of selective APC failures
- Validation, which concerns both recovery and accuracy of APC passenger data
- Unique methodology for APCs compatible reporting requirements

Economic Efficiency



- Corrections based on prior knowledge of mix of bus types and schedule characteristics and accuracy of APC passenger data
- Efficient system matching algorithms
- Unique tool for Data recovery for total system ridership

Innovation



- Transportation systems:
 - Rio de Janeiro - Bus Rapid Transit (BRT)
 - Sweden - Bus fleet Keolis
 - Austria - Bus fleet Postbus
 - Melbourne - Yarra Trams
 - Bucharest - Bus and Trolley Fleet (RATB)

Environmental protection & Saving natural resources



- Integration to VOITH Gearbox
- Reducing waste of parts
- Predictive maintenance
- Supports highest availability of the buses
- Helps operator or authority to reduce costs
- Environmental Reports

General Concept



- Supply of:
- People Counting Sensors
 - Mounting kits



APC Data



Ruter

- Planned Routes
- Stop position
- Geographical database

MATCHING of DATA



Validate



Adjusted Data/Reports

Unfiltered Data



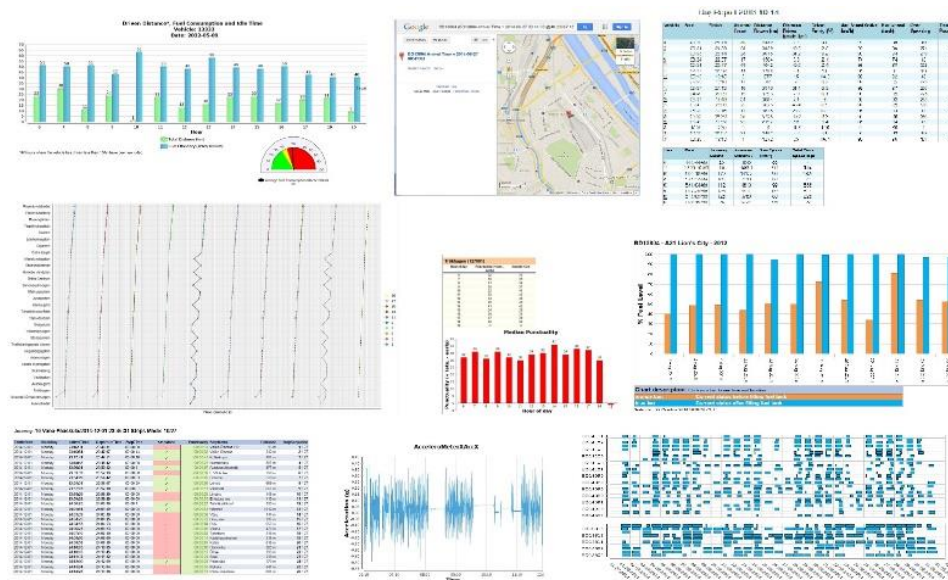
- The system integration:
- Prepare a system concept
 - Supply all components to end user
 - Take care of the installation
 - Verification of counting accuracy
 - Give customers support
 - Error codes/Diagnostics
 - Integration/interfaces
 - Overhaul/Pre-maintenance

Backend Reporting Tool

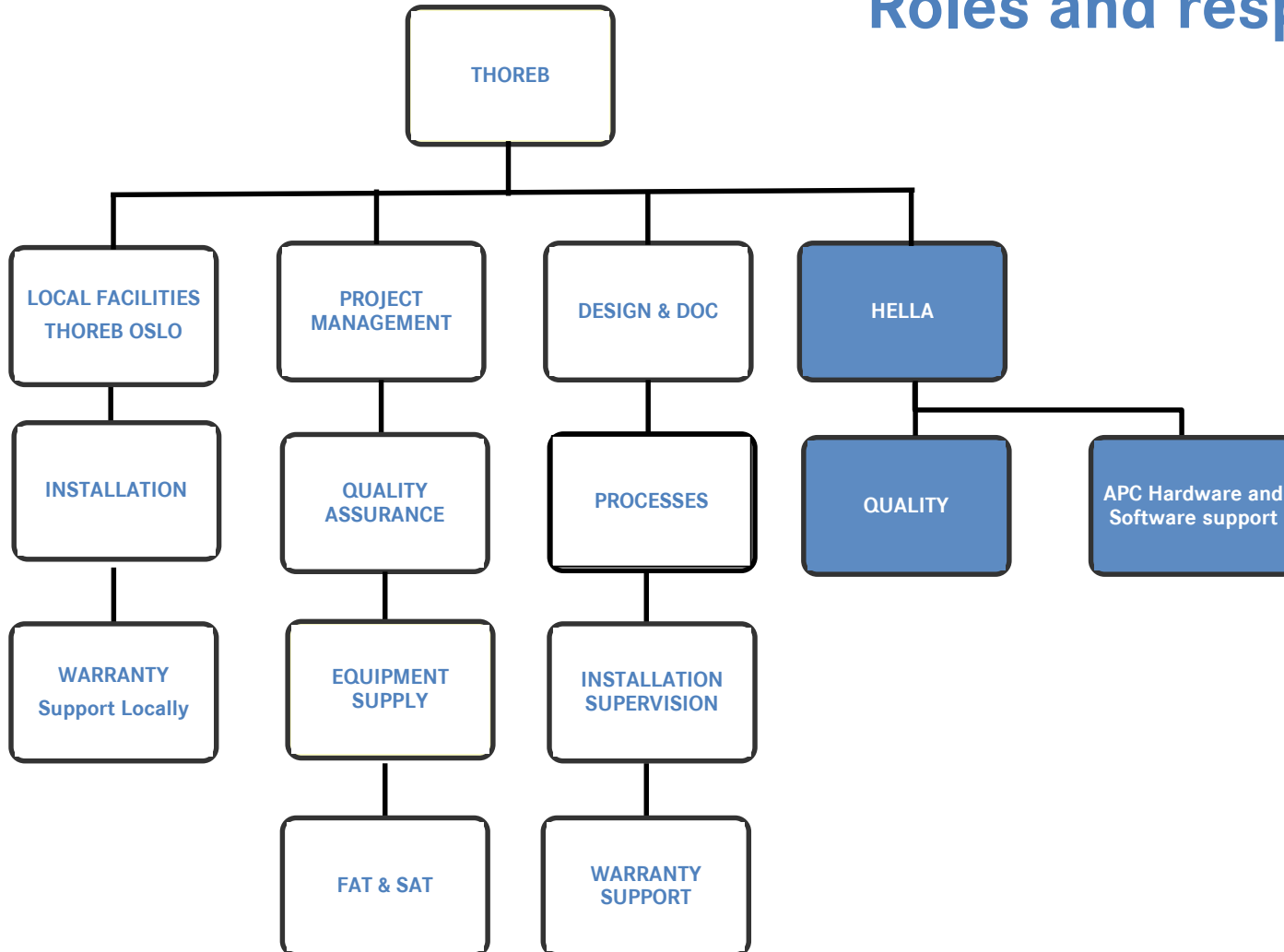
The purpose of the Reporting Tool is to be able to access passenger counting data from vehicles and gather reports about the number of passengers in the public transport. The reports might be about:

- Specific observations of actual measurements in vehicles
- To draw statistical conclusions.

The Reporting Tool shall gather passenger counting data from vehicles, compiled to counting data files, and combine with traffic information files, match the data and insert into a database. From the matched data the reports shall be retrieved.



Roles and responsibility



Thoreb and Hella Aglaia, thinking about the future... today

- Thoreb focusses on the core competence in our CAN/ELSY monitoring, maintenance and servicing and Hella Aglaia in the Passenger Counting, therefore we are the ultimate supplier.
- Making this core competence available to bus authority and operators, Thoreb and Hella Aglaia fosters the efficiency of the overall operation.
- Thoreb is the ideal supplement to existing infrastructure by enabling the operator for maintenance and proactive service
- Thoreb is prepared to be integrated into FMS/CAN/ELSY by local Apps as well as by using the Ethernet capabilities of board computers but also matches to a Smartphone/WiFi solution
- Thoreb enables a platform for a driver's assistant system as well as to integrate other components or existing components such as Ticketing system, Traffic planner, Destination signs etc...



Thoreb have been awarded AAA-rating (highest credit rating award) 2015



AAA HAS TODAY BEEN AWARDED TO

AB THOREB
556201-1949

Thoreb have patents to secure the future and have the leading role world wide



Thoreb and Hella Aglaia, a powerful team...



AND



Customers benefits:

- Long-term partnership (Long-term product availability)
- High-tech products (Advanced 3D-Stereo Vision, compliant for Rail and Road vehicles)
- High-tech concept (Continuous development)
- Future proof technology (Object classification, occupancy measurement)
- Proper assistance and support (Application teams round the world)
- Supplier of systems to the public transport since 1978
- Knowhow and Improved internal processes for drivers' monitoring, workshop management including controlling of the spare parts' stock, claim management etc.

More than 30.000 people counting applications deployed worldwide!

F.ex. Oslo T-bane, Keolis, Postbus, Wiener Linien, Deutsche Bahn,

Tusen takk!

Vielen Dank!

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Tusen Takk!

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