

AI Aware

AI Powered Awareness for Increased Traffic Safety

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ONE CRUCIAL STEP CLOSER TO THE
VISION OF ZERO ACCIDENTS IN TRAFFIC.



A HIVE MIND CREATING
COLLECTIVE INTELLIGENCE.

AI Aware – Focus on Accident Risk Predictions

Project Challenge:

- Is it possible to predict a traffic accident and which precision in time and geography is possible?
- Can preemptive measures be taken based on predictions to avoid accidents?

Planned Deliverables:

- An AI-powered Risk Prediction solution available for a Smart City Central Traffic Control System that can also be used to disseminate critical safety messages to road users.
- Interfaces (“APIs”) allowing for additional data sources to be utilized, such as potentially other vehicle fleets.
- Public demonstrations in Gothenburg.
- Film and presentations for dissemination purpose.

Project Details

Participants

- Volvo Car Corporation (Coordinator)
- Zenseact
- Carmenta
- Ericsson
- HERE Technology
- Swedish Transport Administration (STA)
- City of Gothenburg

Time frame

- 2020-11-01 – 2021-12-23

Budget

- 7.980.000 SEK



Background – Drive Sweden AD Aware Projects

1

AWARE TRAFFIC CONTROL

AD Aware Traffic Control

Digitized traffic control for connected and autonomous vehicles

2

Traffic management of emergency vehicles

Connected and autonomous vehicles (2017-2018)

3

Advanced Cooperative Driver Assistance

For connected and autonomous vehicles (2019-2020)

4

CeVISS – Cloud enhanced cooperative traffic safety using vehicle sensor data

(2020-2020)

5

AI Aware - AI Powered Awareness for Traffic Safety

2016

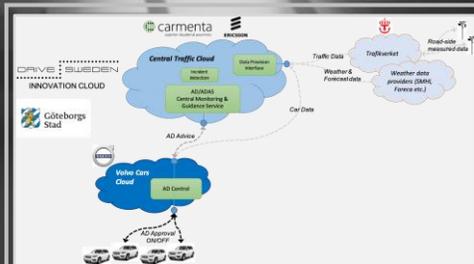
2017

2018

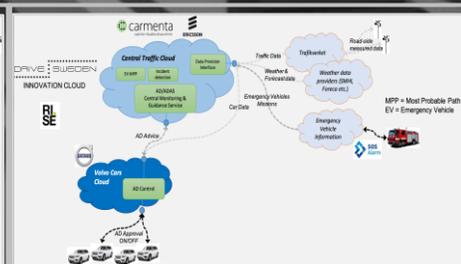
2019

2020

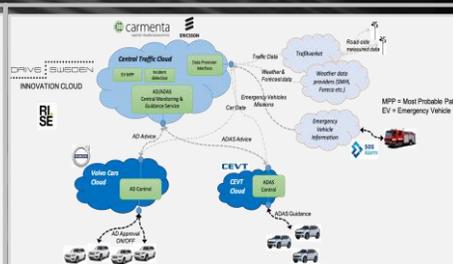
2021



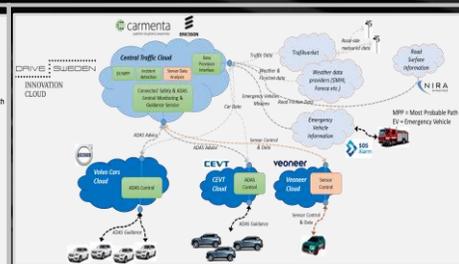
- Cloud architecture setup
- Datex II traffic data
- AD Certified Roads
- Weather data



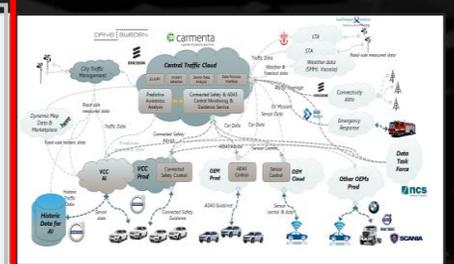
- Emergency center connect
- EVA warning solution
- EV most probable path
- AD vehicle guidance



- Advanced ADAS guidance
- ETSI DENM ITS warnings
- Vehicle probe data
- Slippery road data

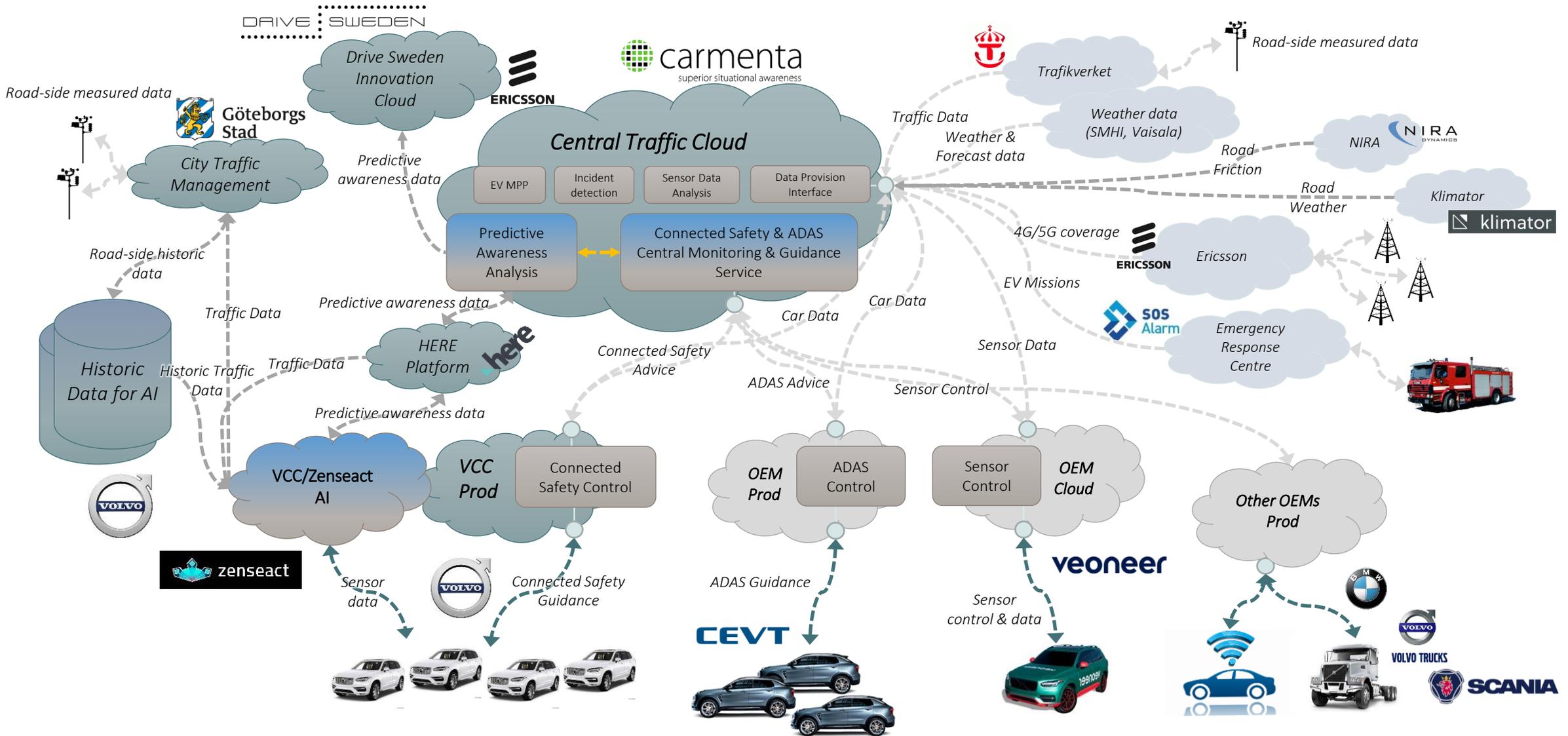


- Cloud enhancement of data
- Automated vehicle guidance
- Vehicle sensor control
- Accident warnings



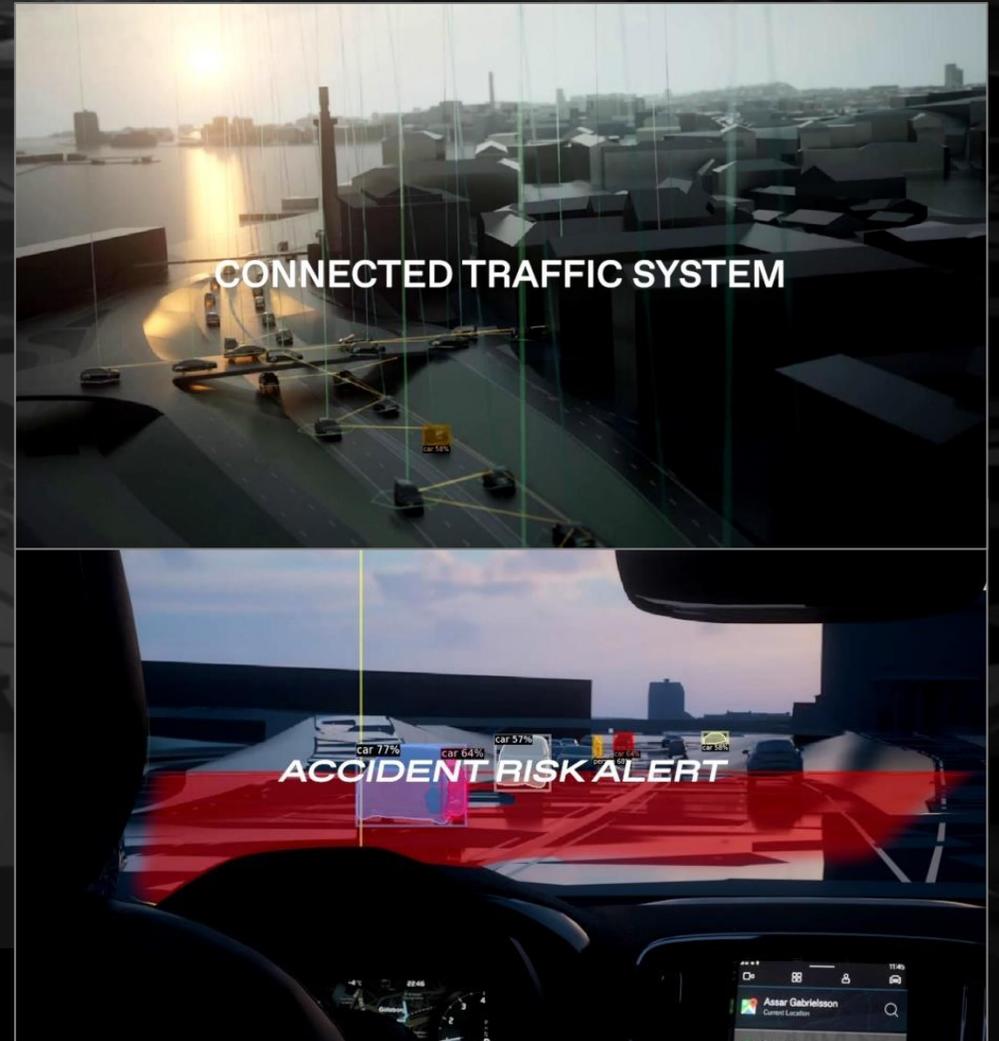
- AI accident risk prediction
- HERE Platform integration
- Advanced data fusion
- Road condition data

AD Aware + AI Powered Awareness - CONCEPT

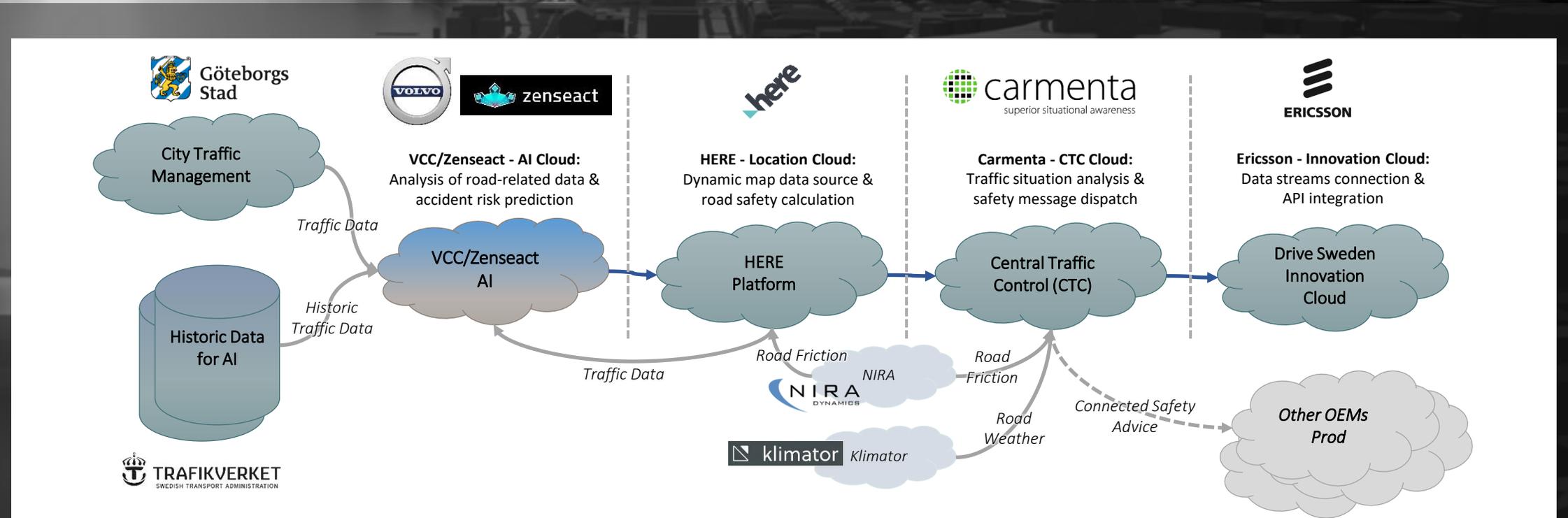


The Predictive Awareness AI module

- Volvo Cars and Zenseact collaborated on developing an AI algorithm for accident risk prediction.
- Real-time data streams and static traffic system data were fused through an algorithm producing a predictive Accident Risk Alert (ARA).
- Data includes road attributes, weather, traffic flow, road friction, accidents and hazards.



AI Aware – Data Flow



- The output from the VCC/Zenseact AI module is an Accident Risk Alert (ARA)
- ARAs were transmitted through the HERE platform to a Central Traffic Control (CTC) and passed on to the Drive Sweden Innovation Cloud.

ARAs in HERE Platform Inspect Tool

Accident Risk Volatile

Catalog: SLX Prediction Provider: VOLVOCARS Layer ID: accident-risk-volatile

Overview **Inspect** Schema

Zoom out to visualize partitions

Accident Risk Alerts on Map

Accident Risk Alert Details

List of Accident Risk Alert

Property	Value
Accident risk level	3
Time	15:44:00
marker-color	#c0392b

```
Message path: Object.features[48].geometry
35: Object
36: Object
37: Object
38: Object
39: Object
40: Object
41: Object
42: Object
43: Object
44: Object
45: Object
46: Object
47: Object
48: Object
  type: "Feature"
  geometry: Object
    type: "Point"
    coordinates: Array [2]
  properties: Object
49: Object
50: Object
```

ARAs in the Central Traffic Control UI

The screenshot displays the CARMENTA TRAFFICWATCH™ interface. At the top, the time is 11:35:12. The main area is a map of Gothenburg, Sweden, with several road segments highlighted in purple, indicating high accident risk. A central box with a red border contains the text "Accident Risk Alerts on Map". On the left side, a panel titled "VCC ACCIDENT RISK SITUATIONS" lists 15 alerts, each with a warning icon and a risk level (low or high). The 10th alert, "Accident Risk high", is highlighted in orange. On the right side, a panel titled "Accident Risk" shows details for a selected alert. The details include: Description: AiAware VCC accident risk prediction; Information: Source: VCC; Accident risk: High; Start: Mon Dec 06 2021 11:32:08 GMT+0100; End: Mon Dec 06 2021 11:47:08 GMT+0100; Tile: 23642688; Road segment: 88695859; Prediction coordinate: 57.71164, 11.99885; Offset: 0.

List of Accident Risk Alerts

Accident Risk Alerts on Map

Accident Risk Alert Details

ARAs in Drive Sweden Innovation Cloud UI

The screenshot displays the Innovation Cloud dashboard. At the top left, it says "Innovation Cloud" and "Dashboard". The main area is titled "Vehicle map" and shows a map with red dashed lines indicating accident risk. A red box highlights the text "Accident Risk Alerts on Map". A tooltip for an "Accident Risk" alert is visible, showing details like ID, severity, start time, and expiration time. On the right, a "Notification" panel lists several "WARNING ACCIDENT RISK" alerts, each with a description and expiration time. Below the map, there are "Available Settings" for "Accident Risk (CTW)", including severity levels (Low, Medium, High) and a mode selector (Actual, By Time). At the bottom, there are "Performance measurements" graphs for "Gothenburg", showing various data points like SMS, RemoteControlle, VideoCall, VoiceCall, DroneService, DLDData, ULData, and Request.

Accident Risk Alert Layer Settings

Accident Risk Alerts Notification Panel

Traffic Safety Workshop with STA experts

Swedish Transport Administration (STA) experts presented the current guiding policies around traffic safety issues in Sweden:

- Roads shall be designed to avoid serious or fatal injuries.
- “Lighter” crashes can be preferred if the number of crashes with fatal outcome or serious injuries are lowered.
- The foundation for any traffic safety analysis is the availability to data.

Workshop take-aways:

- Technology from the project could potentially be used to decide when, and on which roads, autonomous or highly automated driving is suitable/possible.
- AI-based accident risk analysis can guide how to do changes in the road Infrastructure.
- Traffic management is an obvious domain to receive and use crash risk predictions.

Project Results

- Established a solution for data collection and fusion to feed an AI algorithm to issue “Accident Risk Alerts” (ARAs).
- A first implementation of a software module to predict accident risk and issue ARAs.
- ARAs were successfully transferred from Volvo Cars via HERE Platform to Carmenta’s Central Traffic Control (CTC) and further to Drive Sweden Innovation Cloud (Ericsson).
- ARAs channeled through a centralized traffic control system and dispatched in real-time to connected organizations have a great potential to prevent accidents.

Project Findings

- Insight through traffic safety workshop with Swedish Transport Administration
- Successful re-use and extension of the AD Aware Central Traffic Control system
- Successful Drive Sweden Innovation Cloud integration
- It is necessary to collect data on traffic accidents for subsequent analysis and identification of hazardous patterns.
- Traffic accidents often happen on the same road segments and with a correlation in time. These dependencies can be subject of further studies.

The AI Aware film



Next Steps

- All project parties agree on the great potential to increase traffic safety based on the project results and findings.
- The project parties will consolidate the findings and continue their exploration of predictive awareness.
- The availability of large volumes of traffic and road-related data is crucial to feed the AI algorithms. This will be further explored.
- Follow-up projects will possibly be initiated.

Thank you!
Questions?

