

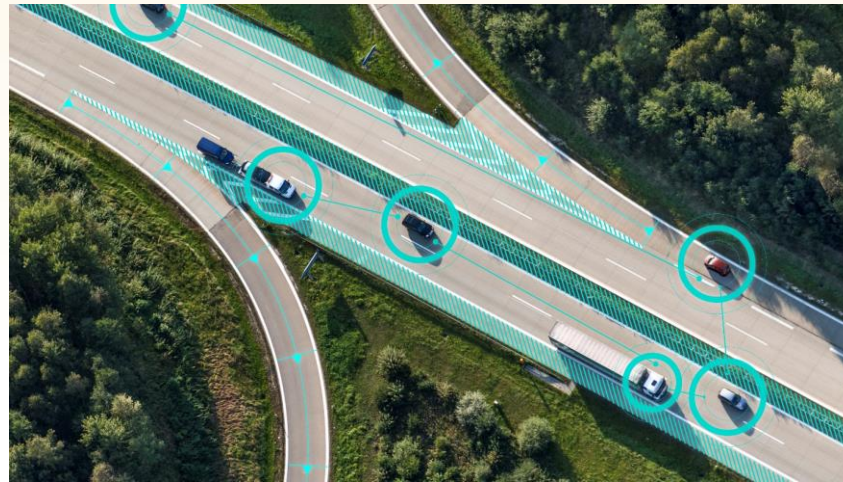
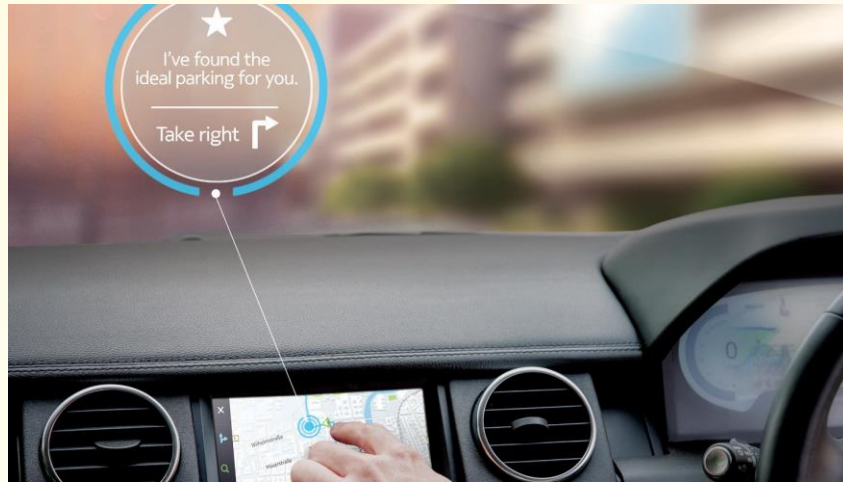


Status overview

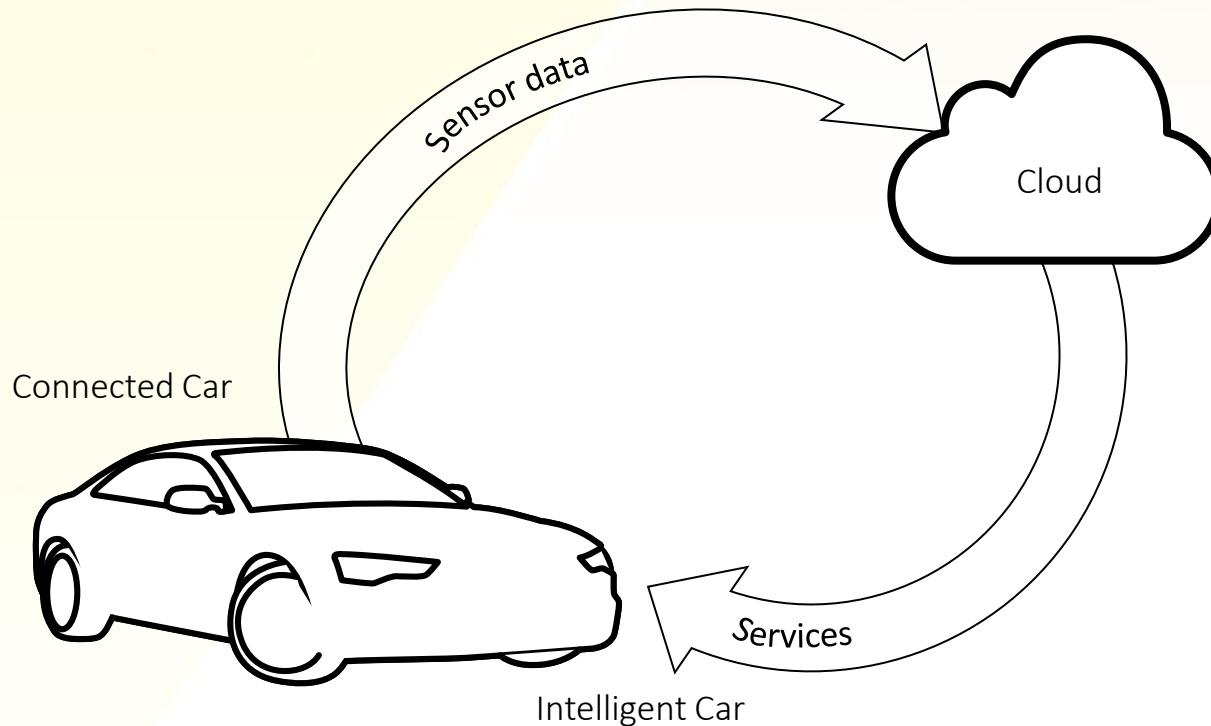
Presentation at ITS Japan in Tokyo on June 5th, 2018

Our Goals

SENSORIS[®]

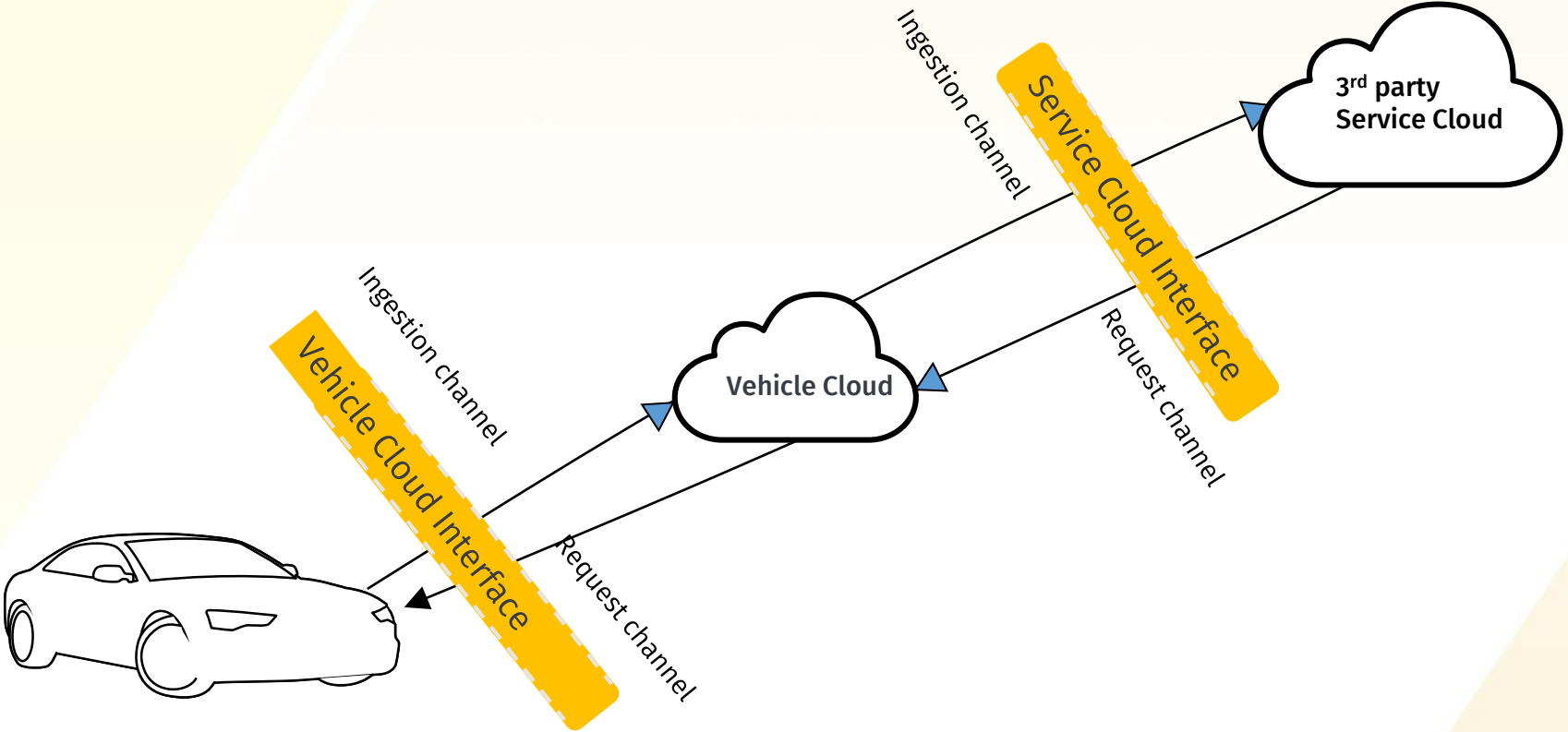


Closing the loop

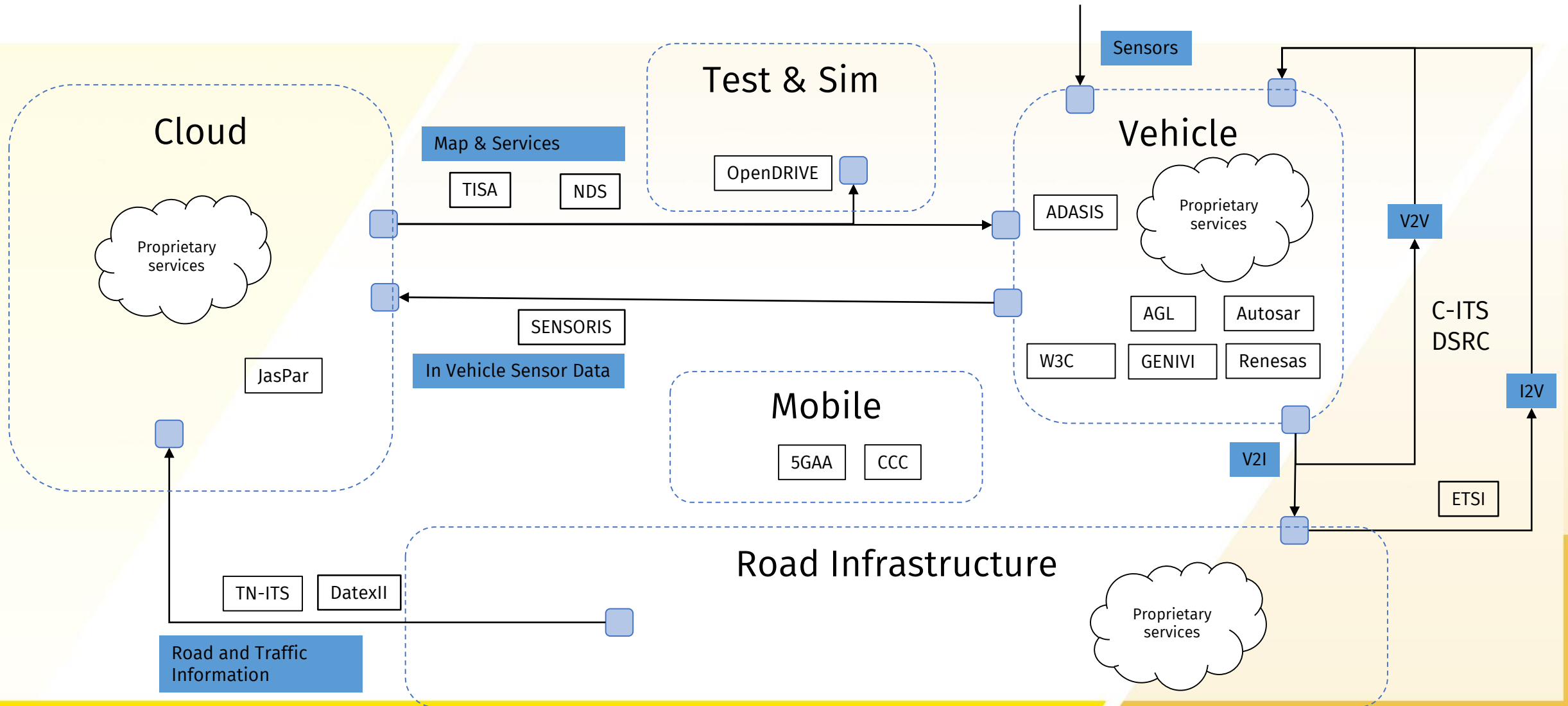


- Data incompatibility
- Siloed data streams
- Information loss
- Implementation overhead

Ingestion and Request



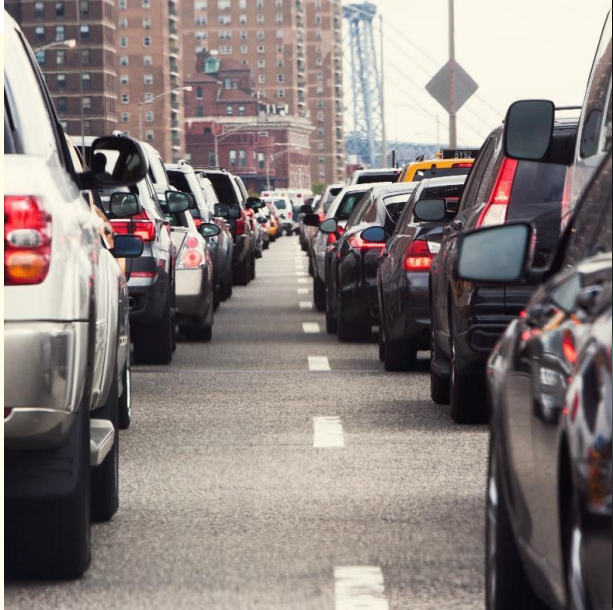
Automotive Ecosystem



Members



Use Case: Real-time services



Traffic flow
Traffic incidents



Hazard warnings

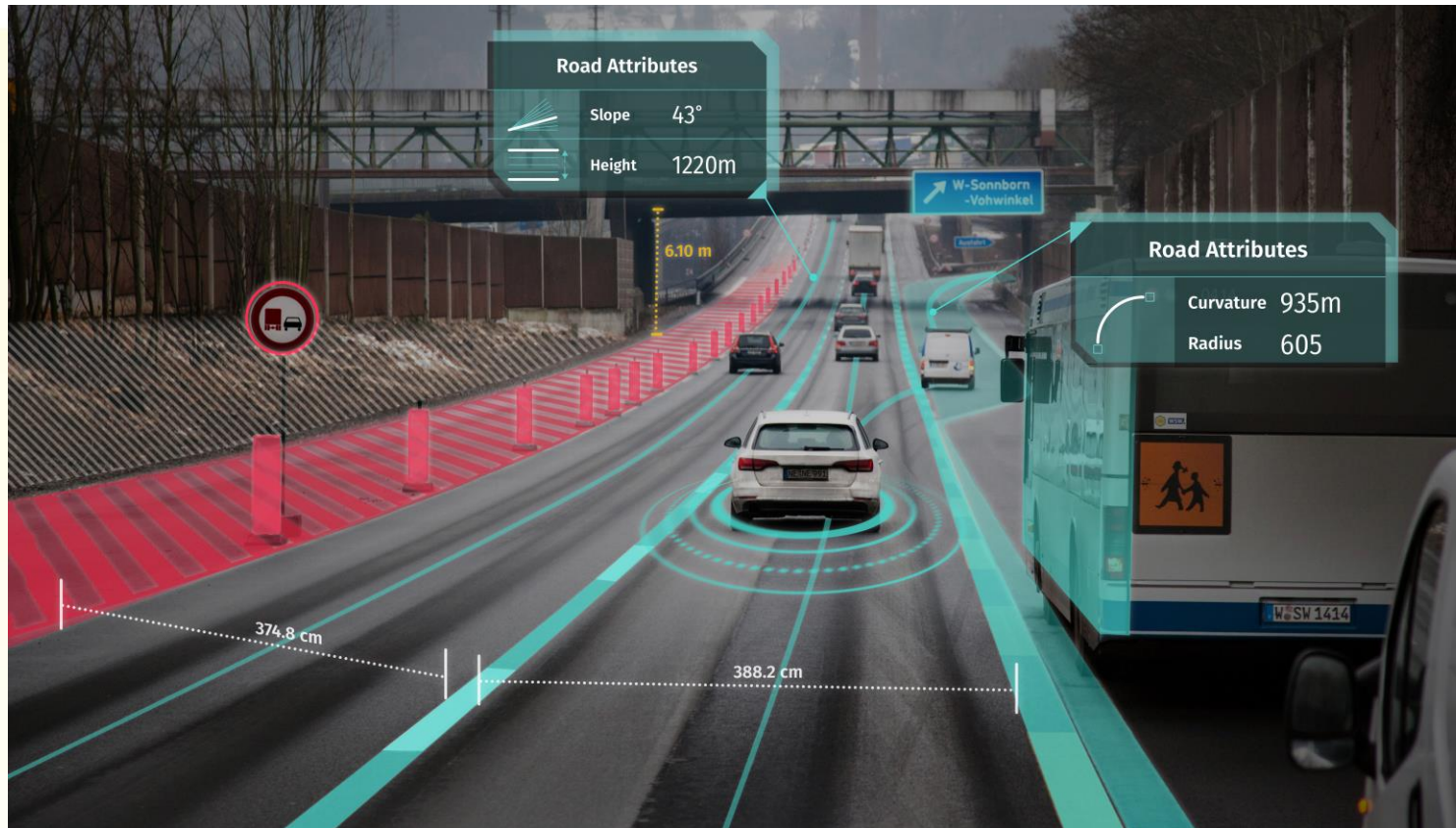


Environmental conditions



Traffic signage

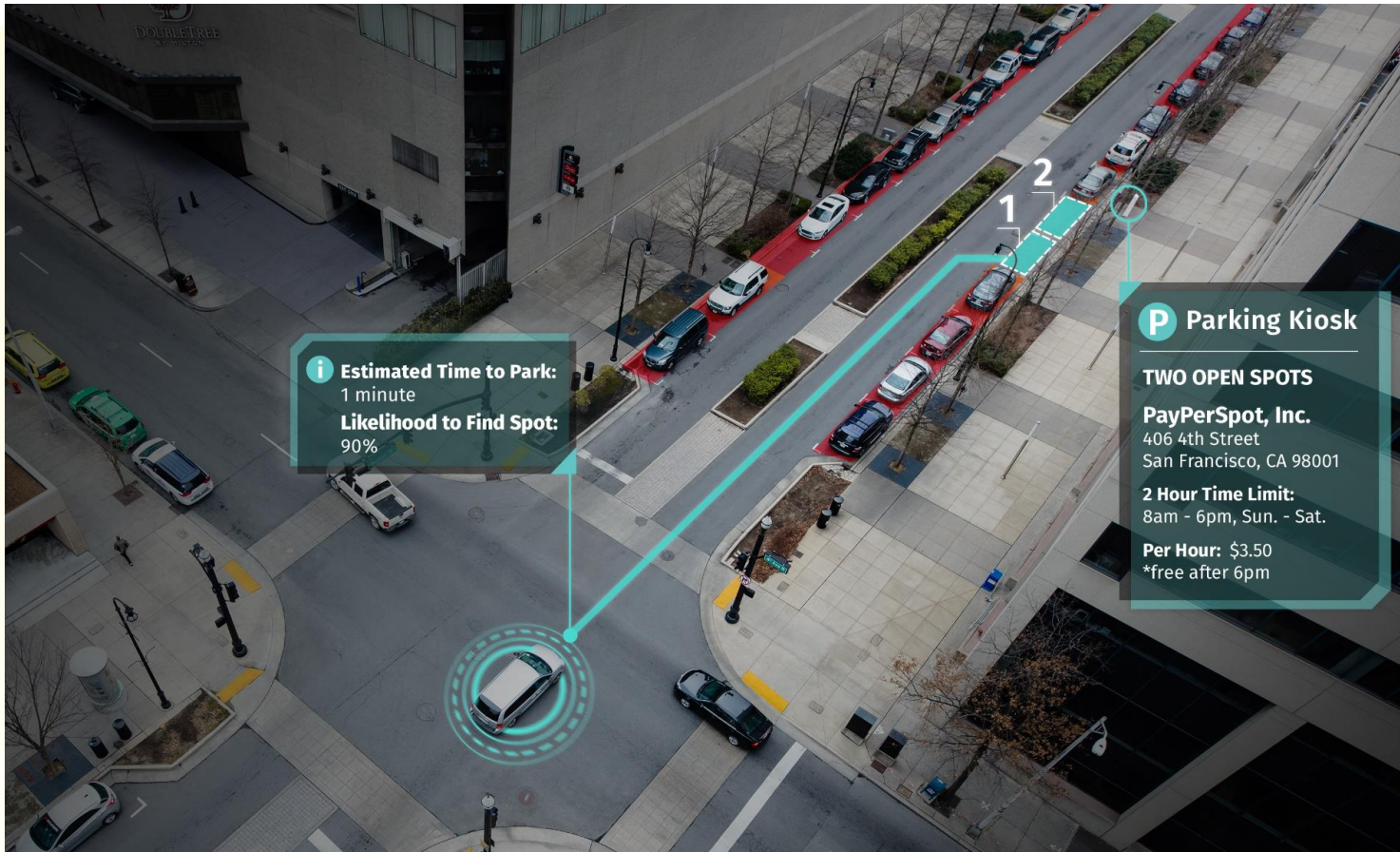
Use Case: Self-healing map



- Road geometry and attributes
- Lane geometry and attributes
- POI entries and exits
- Road condition

Use Case: Statistical analysis

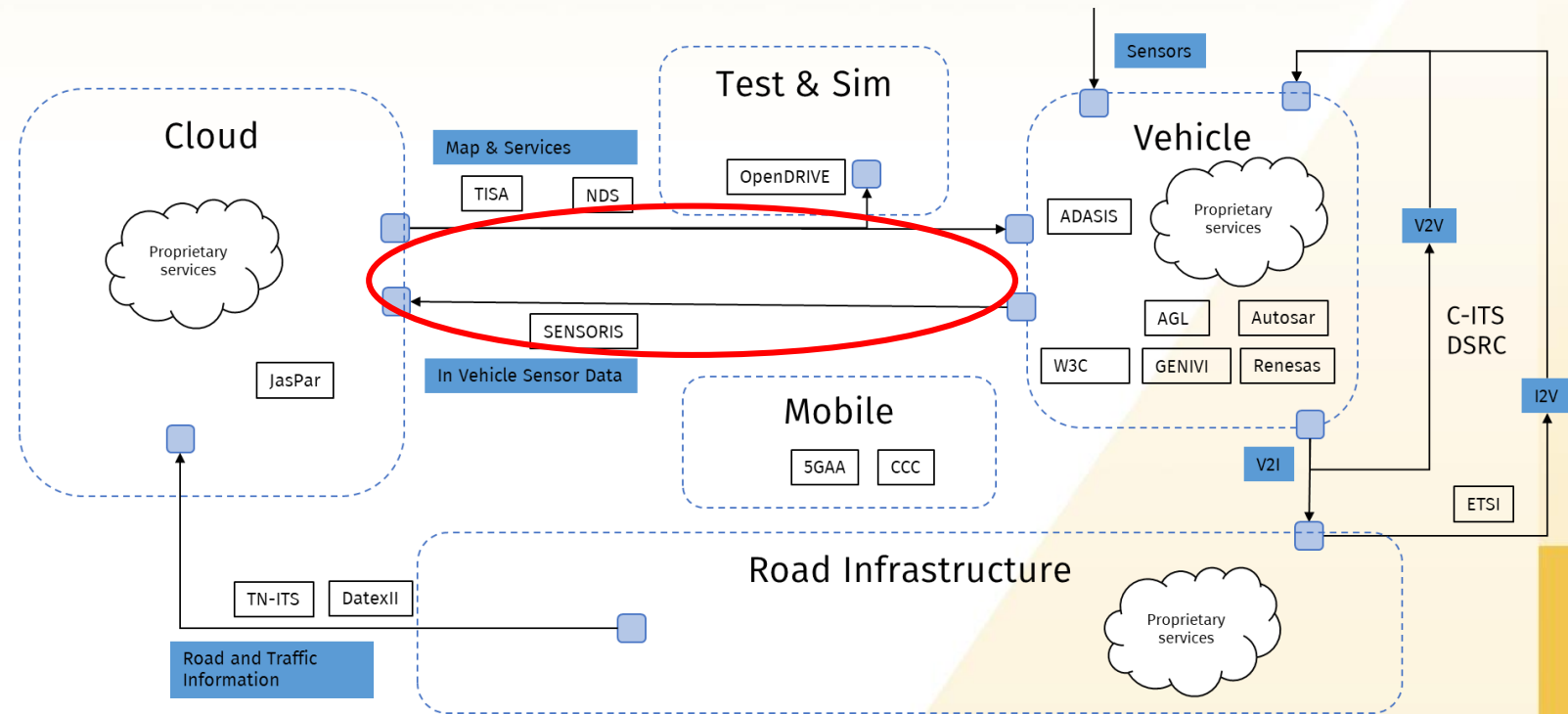
SENSORIS



- Historical and real-time data analysis
- Personal preference learning
- POI recommendations

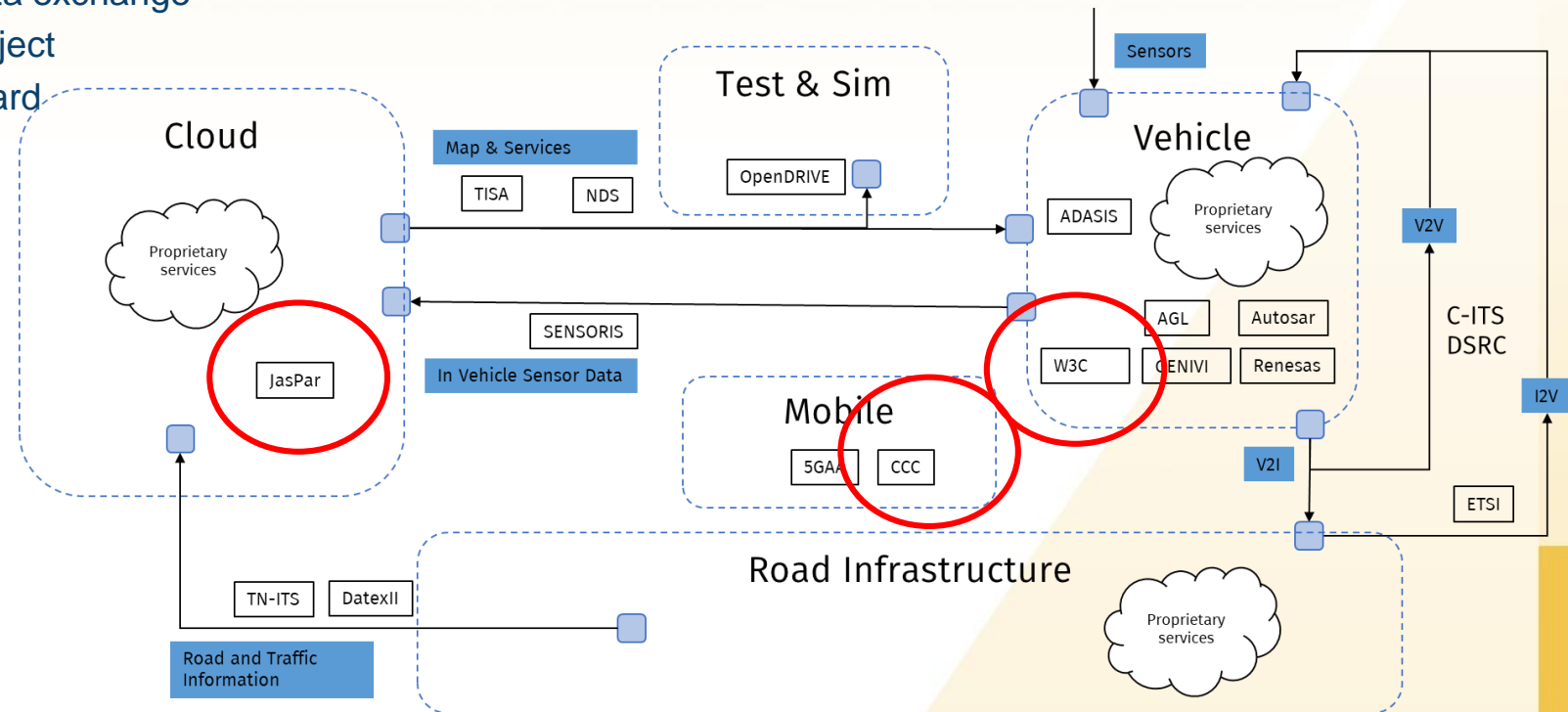
Active Aliances & Liaisons

- Member of the Open Autodrive Forum (NDS, ADASIS, TISA)



Aliances proposals

- Proposals:
 - W3C consortium
 - JasPar, japan cloud to cloud sensor data exchange
 - Ko-HAF, german automated driving project
 - CCC, sensor data transportation standard
- Benefit:
 - Reducing silos
 - Ensuring compatibility
 - Increasing data value



Outlook

- A standard is successful, when used.
- Reducing the number of competing standards increases the overall value for everyone
- SENSORIS is used in real world scenarios

SENSORIS details

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The Specification Work

- Classification of use cases in Short-Mid-Long
- Anonymous Questionnaire for pan-industry requirements
- SENSORIS v1 to concentrate only on the most important Industry-Needs
- Task Forces to focus on special topics
 - GDPR, Privacy regulation
 - Data Size optimization
 - Sensor Data Catalogue
 - Release Process

Task Force: Privacy considerations

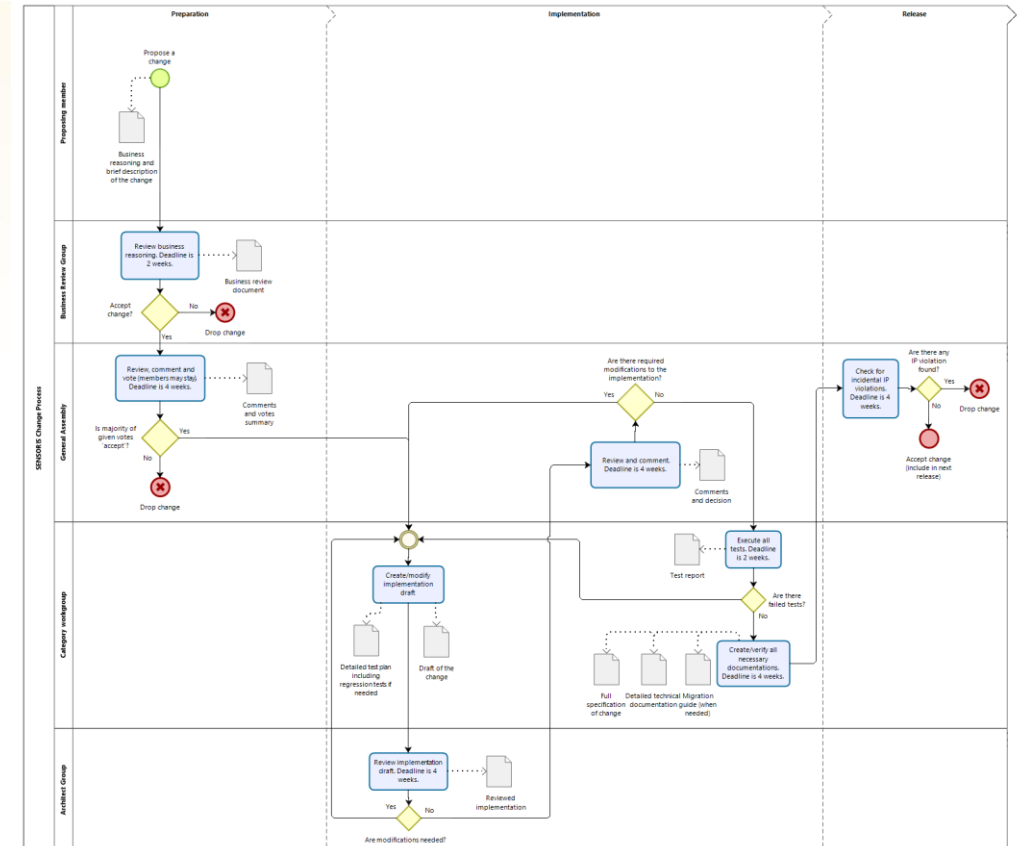
- SENSORIS is flexible
- Privacy data can be handled according to:
 - supplier-consumer agreement
 - data owner consent
 - Regional privacy regulation
- For privacy reasons action can be done:
 - Changing session identifier after a given distance or time
 - Not transmitting any identifier
 - Reducing count of position to a maximum
 - Special encryption of the data payload

Task Force: Data Size Reduction

- SENSORIS targets both cloud 2 cloud but also vehicle 2 cloud interface
- Protobuf „double“ uses 8 byte. „Int64“ uses variable encoding between 1byte and 10byte
- Common data compression
- Overall summary: With int64 and compression 50-70% of data reduction are achieved.
- No further reduction needed

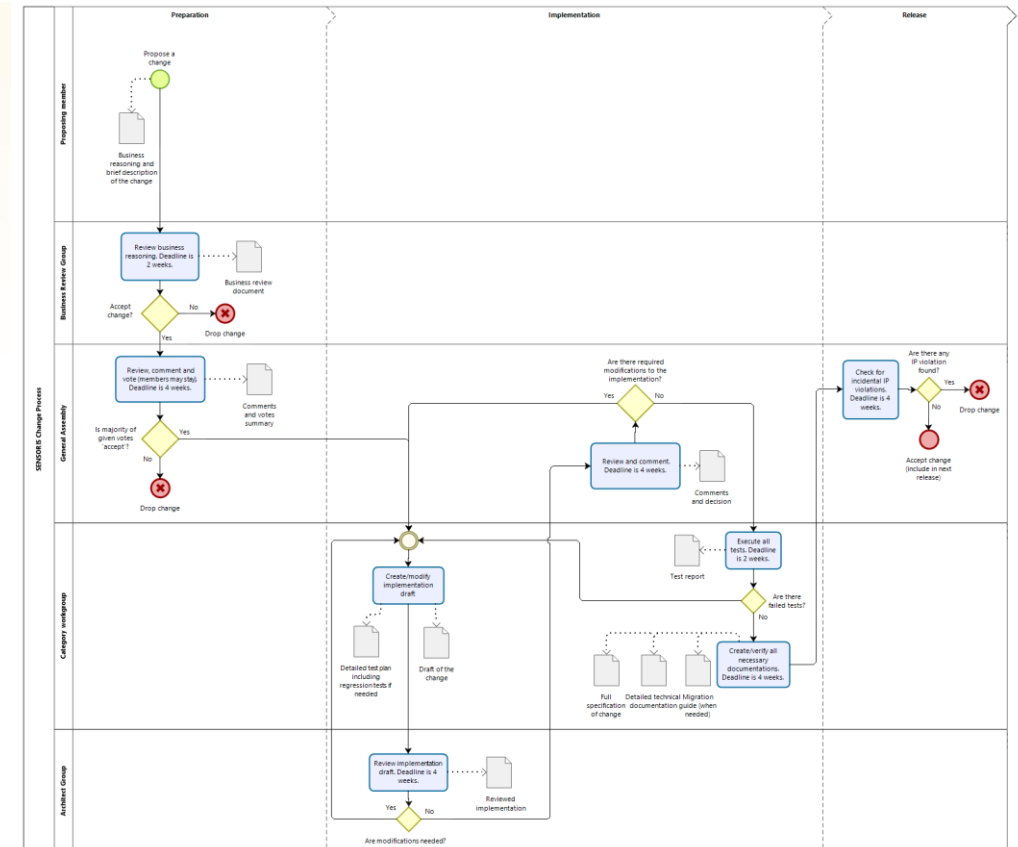
Task Force: Release Process

- Change Request process
 - Business scope
 - Technical scope
 - General Assembly
 - Architecture
- Well defined deliverable
 - Test Cases
 - Documentation
- Definition of done



Task Force: Release Process

- Release impact
 - Minor with downwards-compatibility
 - Major with compatibility breaks
- Release process
 - Quarterly minor releases
 - Optional hot fix releases
 - Major releases every 1-2 years
 - Only changes that are „done“
 - Successfull testing mandatory
 - Including Documentation



Task Force: Catalogue

- Benefit for Liaisons and Aliances
- Attributes are mapped to a taxonomy tree
- Mapping between Standards over unified taxonomy tree.
- Proof of Concept within Open Autodrive Forum with NDS, ADASIS, TISA
- Communication with ISO and W3C

Data Format Structure

- Data format has:
 - Events (vehicle data, localization, road condition, weather, traffic signs, ...)
 - Sources (sensors like GNSS or Camera, sensor fusion like algorithms)
 - Relations between Events and Events or Events and Sources
- Flexible data content according to use cases:
 - Single event content (e.g. 1x Position, 1x Speed)
 - Full drive data (e.g. 5h of position, speed, traffic signs, road attribution and weather)

Events

One event can contain:

LocalizationCategory

ObjectDetectionCategory

WeatherCategory

DrivingBehaviorCategory

IntersectionAttributionCategory

RoadAttributionCategory

TrafficRegulationCategory

TrafficEventsCategory

TrafficManeuverCategory

BrakeCategory

PowertrainCategory

MapCategory

Relations

- A relation defines a connection between events, e.g.
 - 1..* LaneBoundary LEFT_OF 1 LANE
 - 1 TrafficSign EQUALS 1 ObjectDetection
 - 1..* TrafficSignalBulb GROUP 1 TrafficSignal

Data Encoding

- Google protobuf v3
 - Efficient encoding
 - Language support
 - FieldOptions – variable resolution interpretation
 - Version compatibility
 - Including documentation generator
- Individual resolution and variable bit encoding

Request Channel

- Reducing costs
- Allowing for multiple specialized use cases
- Planned for next SENSORIS version
 - Multiple conditions
 - Geographical (bounding box, area, corridor)
 - Temporal (daterange, timerange, day of week)
 - Sensor based conditions (event based trigger)
 - Submission priority

End of Slides

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SENSORIS

Global interface cloud Information in-vehicle Sensors

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