

Your Digital Solutions & Services Partner

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VISION, MISSION, CORE VALUES

Vision

To contribute and accelerate the world's transition to digitalization with the highest ROI, optimized costs, and maximum safety.

Agility
Integrity
Quality
Innovation
Diversity
Inclusion

Mission

To create a complete set of digital solutions, services and digitally skilled human resources that empower our customers to fully utilize their assets for sustainable growth.

Digital Transformation Consultation



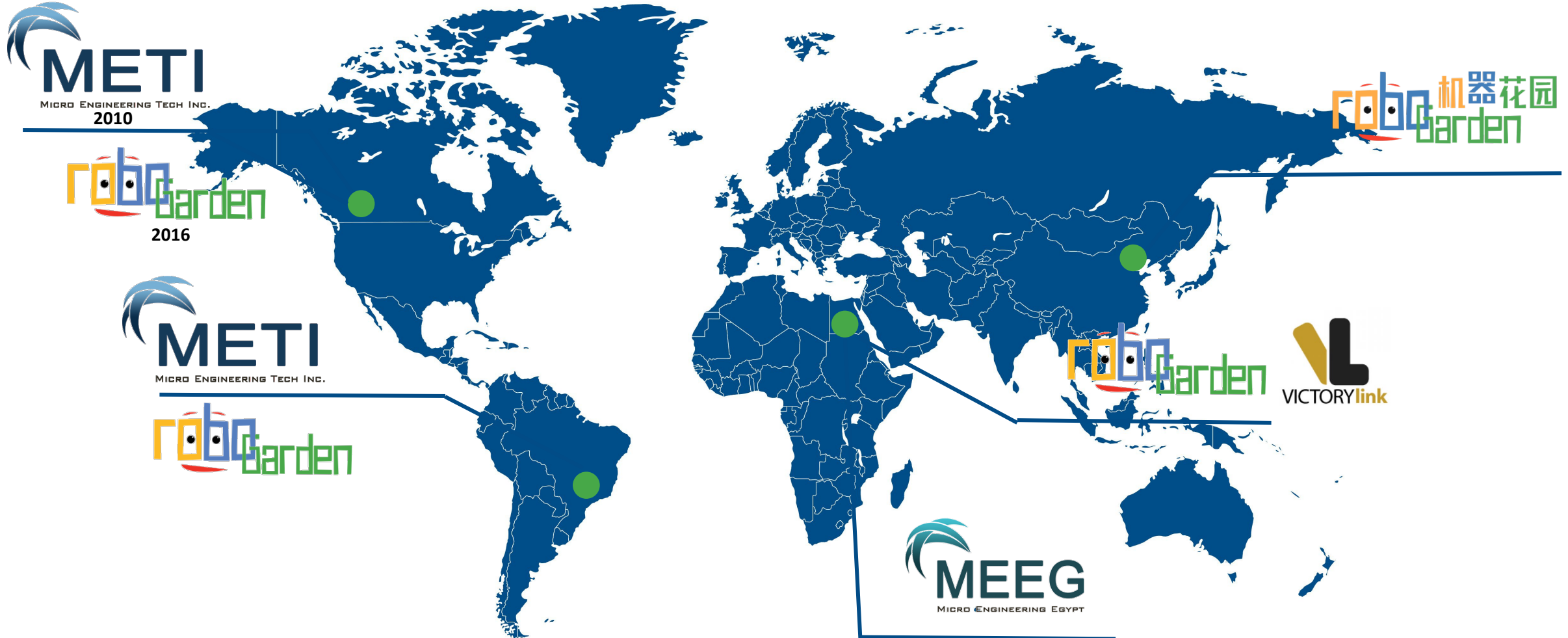
Services

Training

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METI Group Companies Facts



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METI Group Companies Facts

200+

Diversified team members

45+

Software developer

10+

R&D Phd and MSc
team members

2+

Sustainable access to tier
1 R&D Groups Canada

100%

Of our technologies and
services generating revenue

5+

Countries existing
International
business channels

8+

Successful years of
SRED, IRAP and
Alberta Innovate
projects

350+

HR scalability for skilled and
talented employees in less
than three months

DIGITAL TRANSFORMATION

Solutions and Services

Digital twin for asset management

Laser scanning

Point cloud production

2D drafting

As-Built 3D modeling

Intelligent 3D modeling

As Built P&ID, PFDs and Isometrics

Scan to BIM

Urban documentation

Archaeological documentation

Pipeline construction surveys

Design verification

Engineering services

GIS services

Navigation sensors

UAV

GNSS

Data analytics

Artificial intelligence

Modular supports design

HD mapping services

Structural health monitoring

Hazard areas studies

Smart cities

Software development

Cloud-based solutions

IoT solutions

Computer vision solutions

App/Web development

UI/UX

Full Stack development

Navigation solutions

Vision-based navigation

Digital library development

DevOps services

Artificial intelligence labeling

Award winning company



NRC-IRAP

Mitacs



ALBERTA INNOVATES

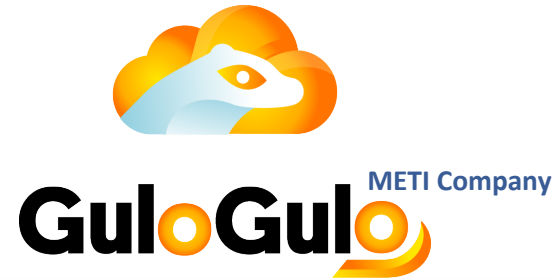


CONNECTION SILICON VALLEY



IP: Services & R&D: Digital Transformation Road map

METI Products (IP)

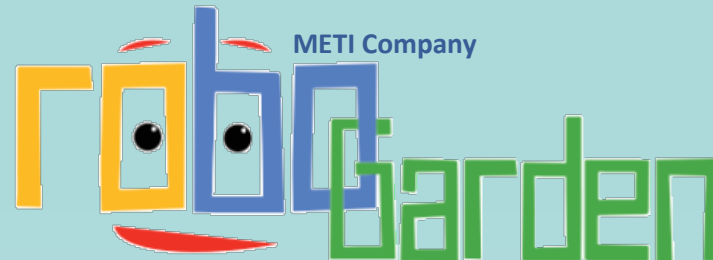


5G-enabled Vision-based HD Mapping
Autonomous Navigation Solutions



Machine Learning Classification

Powered by METI



What we do?

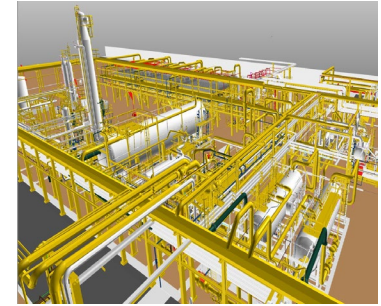
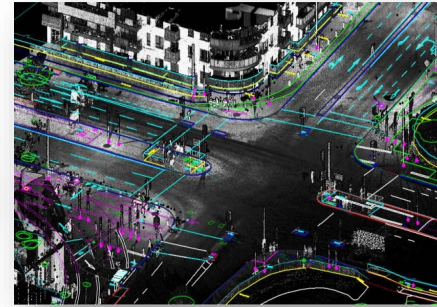
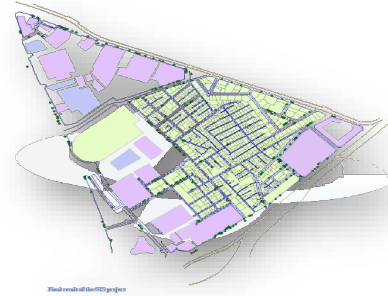
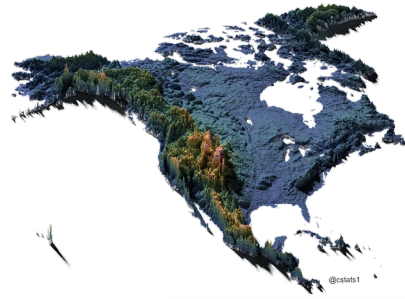
Static
3D Models

Dynamic
3D Models

Digital
Twin

GIS (LOD 1 to 3)

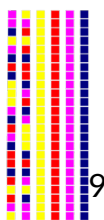
BIM (LOD 100 to 500)



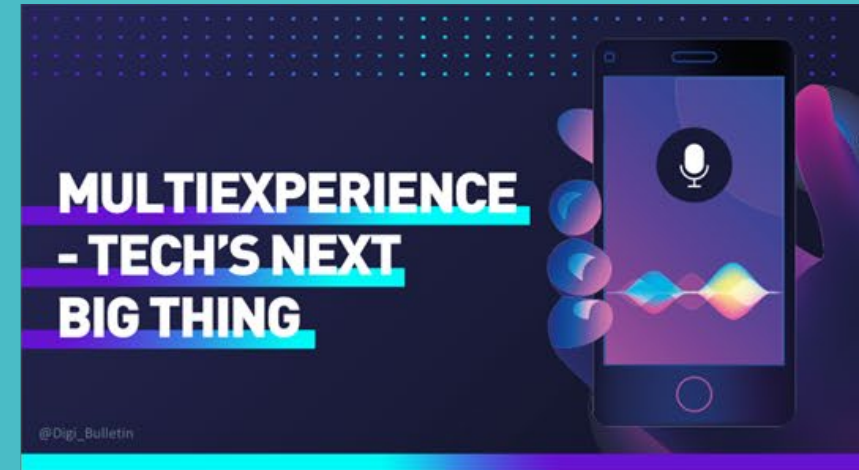
BIG DATA

ANALYTICS

DECISIONS



Technologies? Services & R&D: Digital Transformation Road map





UNIVERSAL PLUG & PLAY HD-MAPPING AND LOCALIZATION

METI PROPRIETARY SOLUTIONS FOR THE ERA OF SMART INFRASTRUCTURE AND 5G

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CHALLENGES IN 2023

CHALLENGES FOR INFRASTRUCTURE HD-MAPPING AND MAINTENANCE



CHALLENGES IN 2023

■ Data accuracy

While HD maps are designed to be highly accurate, inaccuracies can still occur due to various factors, including

- weather,
- construction work,
- and other environmental changes.

As a result, there is a need to continuously update and maintain these maps to ensure their accuracy.



CHALLENGES IN 2023

- Data interoperability

HD maps are typically produced by **different vendors**, and this can result in compatibility issues when different maps are integrated into a single autonomous driving system.

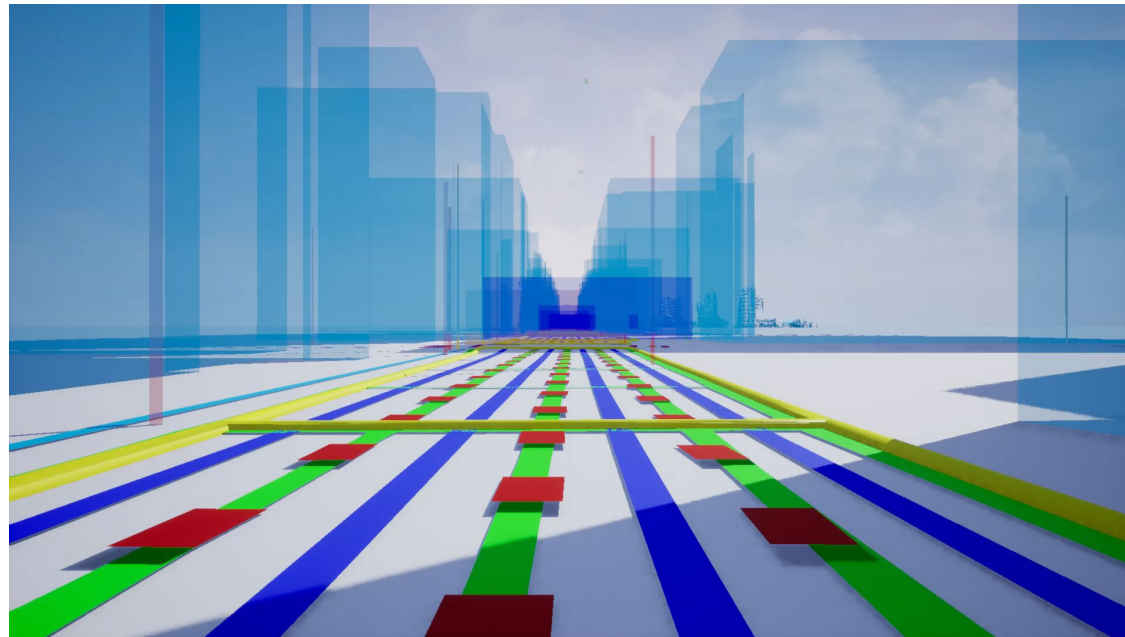
This can make it challenging to maintain a consistent and accurate view of the road environment.



CHALLENGES IN 2023

- Data Management

HD maps generate large amounts of data, and managing and storing this data can be challenging. There is a need to develop effective data management systems that can handle the large volumes of data generated by HD maps.



METI's Calgary downtown HD-Map

CHALLENGES IN 2023

■ Standardization

There are a few different standardized formats for HD maps, which can make it difficult for different vendors and autonomous driving systems to communicate effectively. This can result in compatibility issues and hinder the widespread adoption of HD maps.

Open Standards



Autaware

Autaware Vector Maps



ASAM

ASAM OpenDrive



FZI Lanelet2

Proprietary Standards



NVIDIA®



Navigation Data Standard



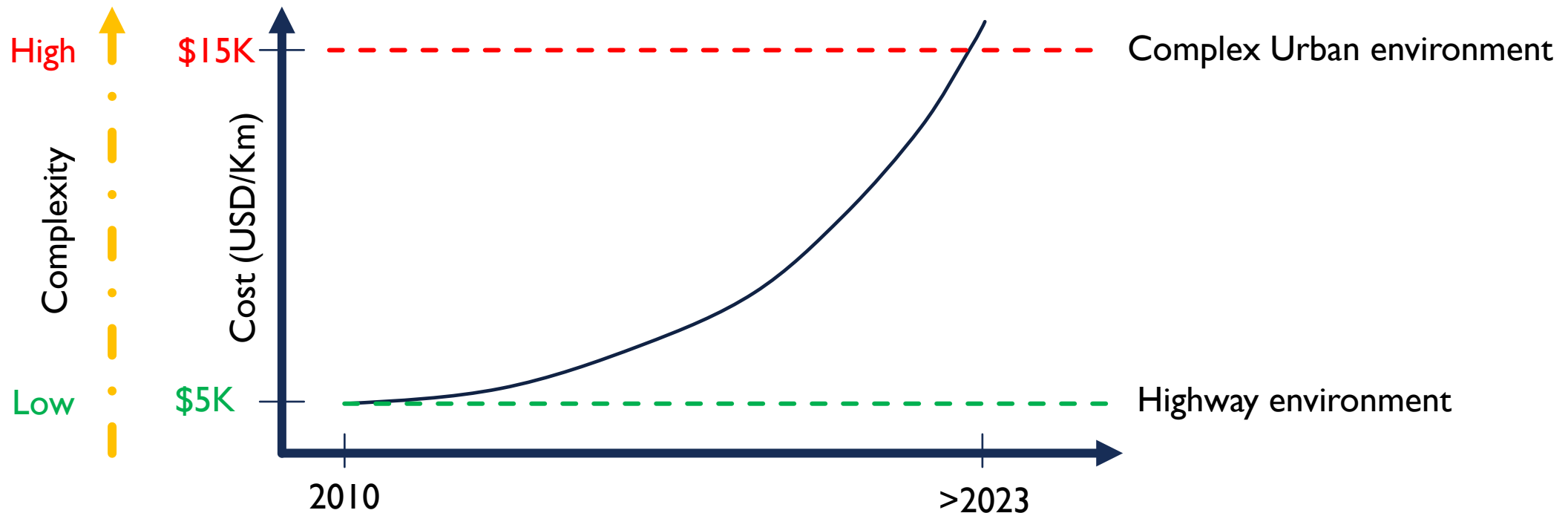
Navigation Data Standard

Open Lane Model

CHALLENGES IN 2023

■ Cost

HD mapping technology can be expensive, which can limit its adoption by smaller municipalities, companies and organizations. There is a need to reduce the cost of producing and maintaining HD maps to enable wider adoption.





METI HD-MAP SOLUTIONS

INFRASTRUCTURE AI-POWERED HD-MAP UPDATES



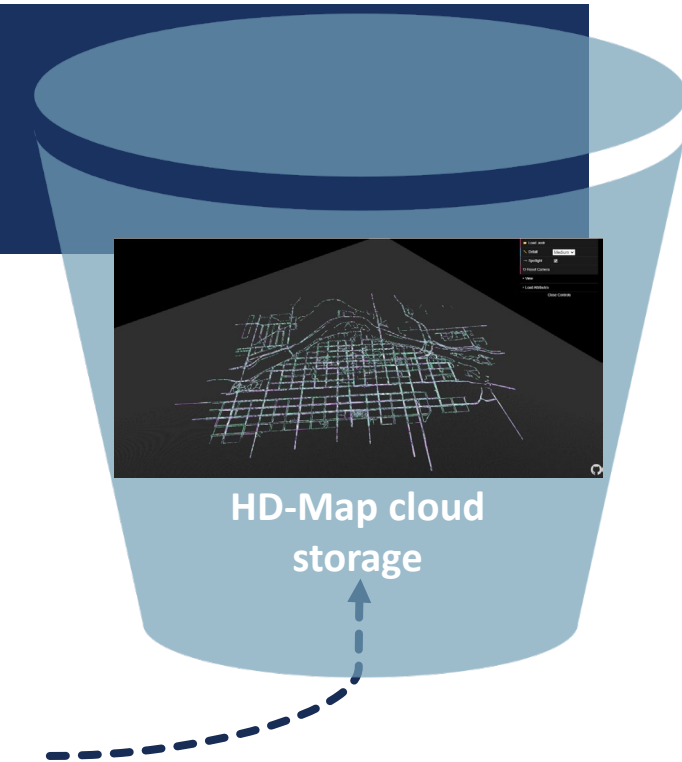
INFRASTRUCTURE AI-POWERED HD-MAP UPDATES

- METI's technology focus is training AI models on the detection, classification, and localization of road infrastructure that is most important for HD-Map stakeholders, e.g., municipalities, automotive companies, ... etc. The most challenging infrastructure updates are done on road markings, vegetation, and construction zones.



Videos taken from Calgary downtown
HD-Map update

AI Infrastructure Detection and Classification



AI Infrastructure Localization



INFRASTRUCTURE AI-POWERED HD-MAP UPDATES

- With our proprietary technology, we deliver HD-Map updates through both ends of the mapping hardware spectrum
 - Commercial grade hardware (Smartphone: Camera, IMU, GNSS, embedded LiDAR (iPhone only))
 - Mapping grade hardware (LiDAR, multiple cameras, Electronic Scanning Radar (ESR), INS)



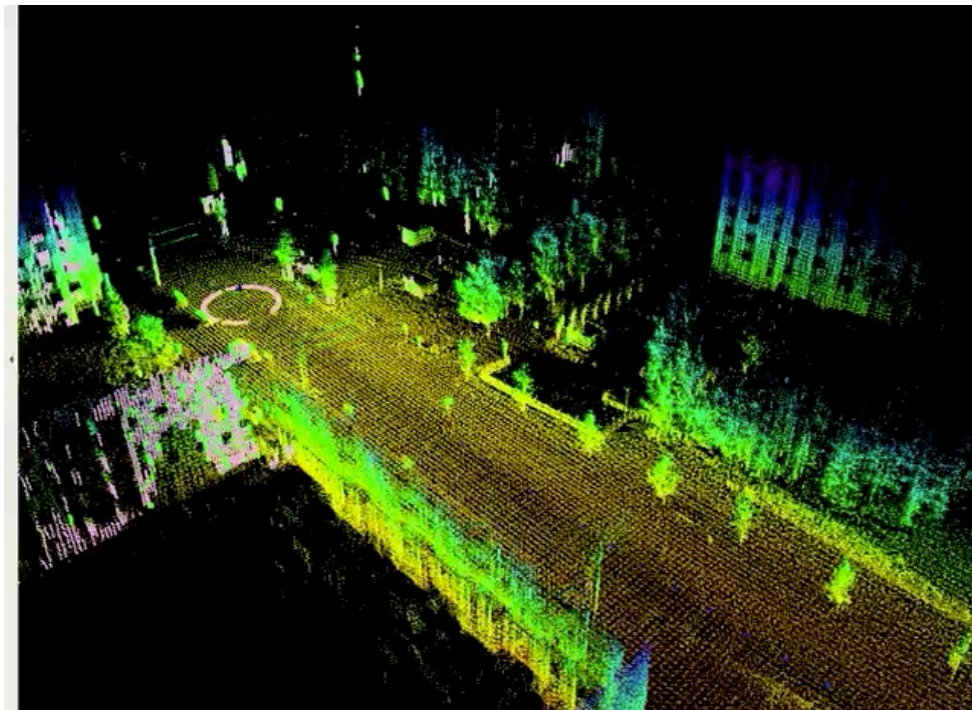
METI Smartphone App for cloud-based AI
HD-Map update



METI fully-equipped test-bed vehicle

INFRASTRUCTURE AI-POWERED HD-MAP UPDATES

- METI has also been working on 3D Maps production and update from LiDAR scans within our collaborative work with our European research and industry partners.



3D Map building in Tampere, Finland



METI HD-MAP SOLUTIONS

ROAD DISTRESS AND MAINTENANCE AI HD-MAPPING

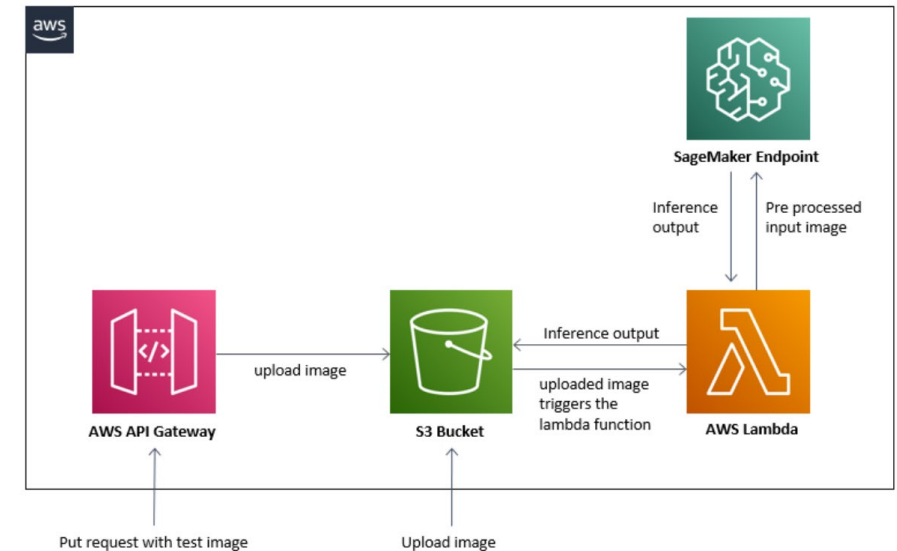


ROAD DISTRESS AND MAINTENANCE AI HD-MAPPING

- METI offers AI-powered road maintenance solution for distress mapping.
- METI's road distress solution offers magnitudes of cost and time savings against conventional inspection methods.

	Conventional method (Visual inspection) Cost/day (USD)	METI road maintenance web service Cost/day (USD)
Vehicle	25	25
Driver	20	20
Expert Engineer	25	-
Technical office Engineer	20	-
Cloud services	-	5
Time Taken	2 months	1 day
Cost / 120 Km	5,400	50
Cost / 1 Km	\$45	\$0.42

Latest tests shows significant cost and time savings



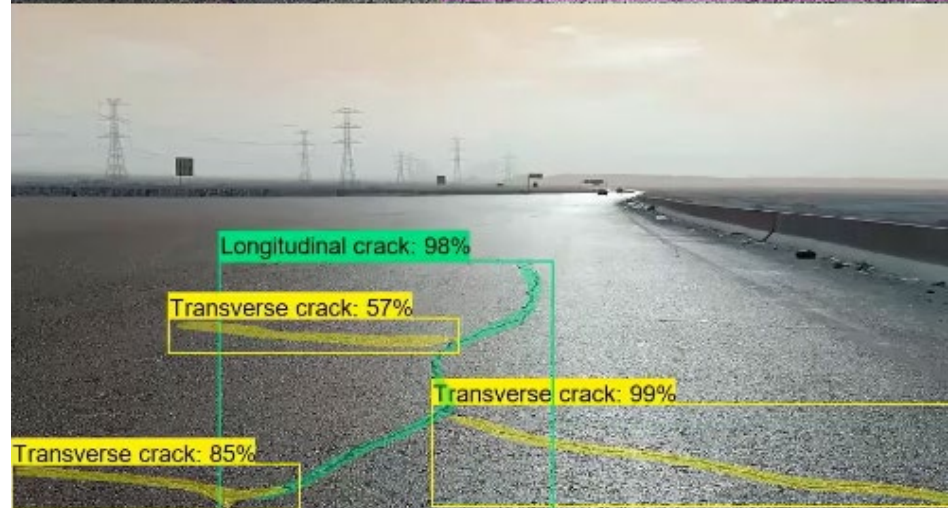
Cloud and AI services provided by Amazon AWS solutions

ROAD DISTRESS AND MAINTENANCE AI HD-MAPPING

- Our AI models can achieve accurate distress classification for all kinds of cracks and potholes.
- It can be seen in the video that our models can generalize very well, detecting cracks that were not in the training set Groundtruth labeling.
- Currently training on other types of wide area distresses, e.g., raveling and shoveling, etc.



Groundtruth



METI Road distress detection model



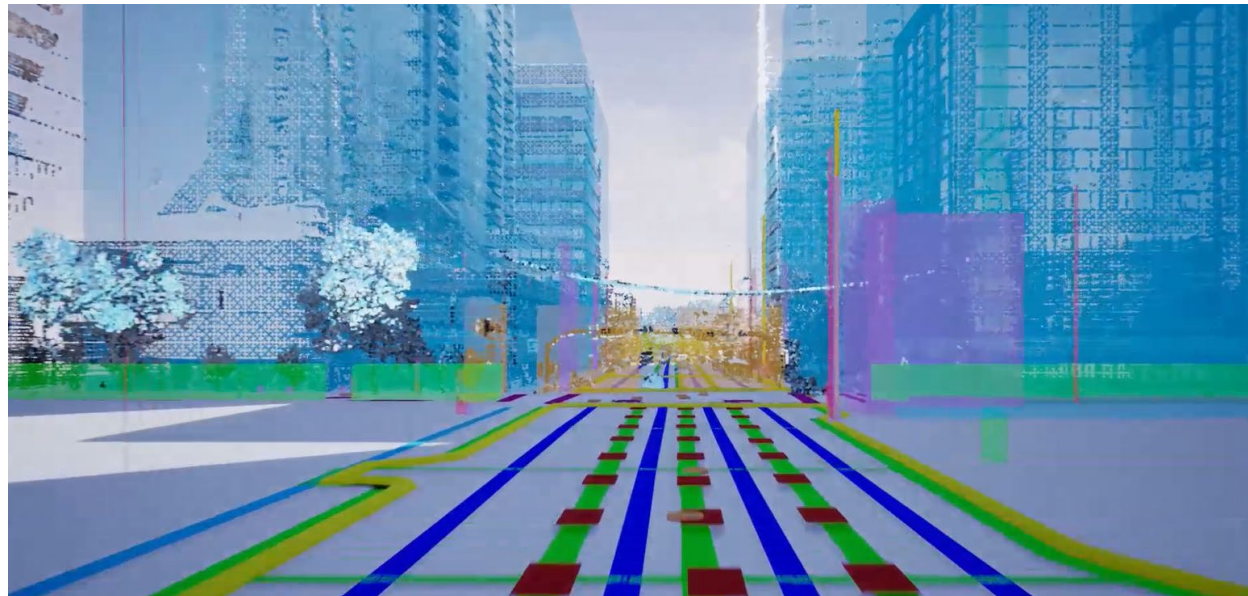
METI HD-MAP SOLUTIONS

INFRASTRUCTURE GEODATABASE-TO-HD-MAP CONVERSION SOFTWARE



INFRASTRUCTURE GEODATABASE-TO-HD-MAP CONVERSION

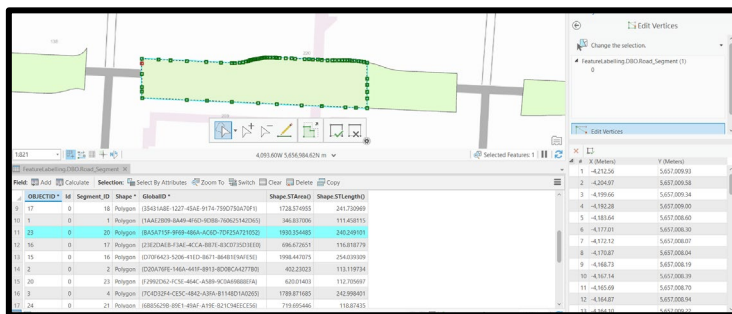
- In an effort to solve several HD-Mapping problems, METI has been working on its Geo2OpenDrive software tool
 - Reducing the cost to produce an accurate HD-Map by utilizing already available Geodatabases and OpenStreetMaps
 - Standardizing the output HD-Map format coming from different survey companies
 - Offering a pipeline to facilitate interoperability between different vendors



METI's Calgary downtown HD-Map

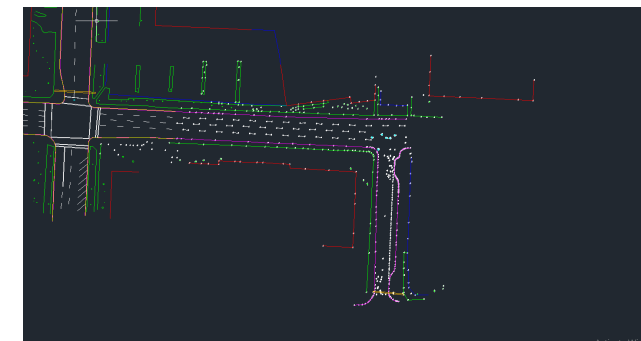
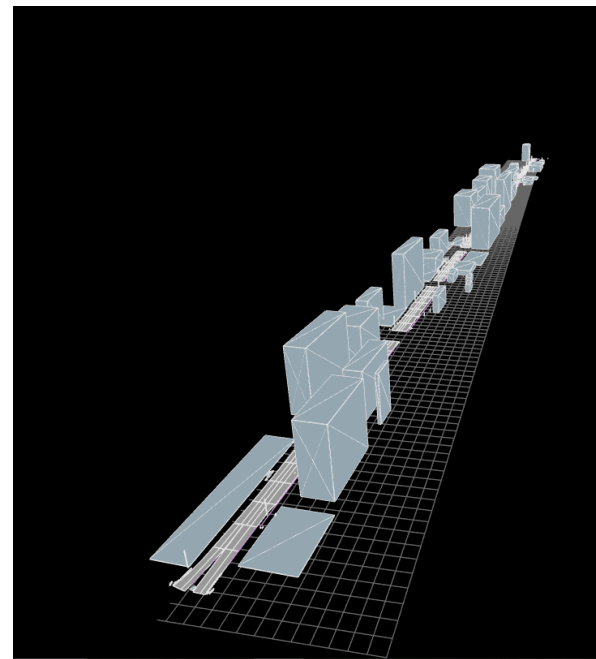
INFRASTRUCTURE GEODATABASE-TO-HD-MAP CONVERSION

- Our Alpha version of the Geo2OpenDrive tool provides the following features
 - ESRI GeoDatabase or Shp files to OpenDrive format conversion with sub-meter accuracy
 - Open Street Maps (OSM) XML-based formats to Open Drive format conversion with sub-meter accuracy



Geodatabase/Shp files

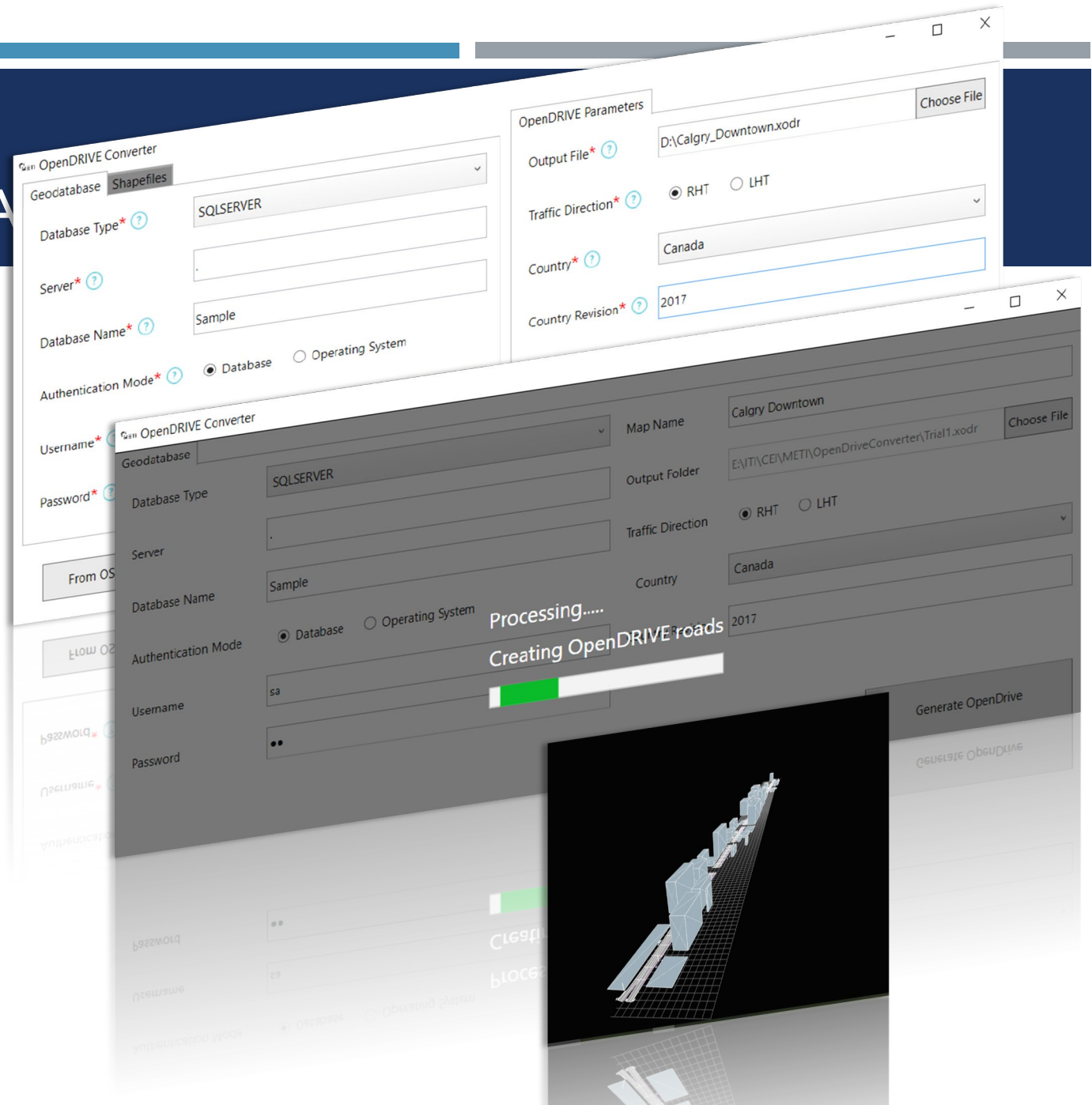
OpenDrive Map



OpenStreetMap XML

INFRASTRUCTURE GEODATA

- A neat and sleek GUI
- Several QC testing cycles have been conducted with mapping and navigation engineers testing the tool to validate the conversion accuracy.
- Extended testing will commence with the utilization of the OpenDrive maps into the Gulo Gulo positioning process.
- An extensive user guide available.
- A licensable version will be available for the Beta version wide scale customer probes.





METI HD-MAP SOLUTIONS

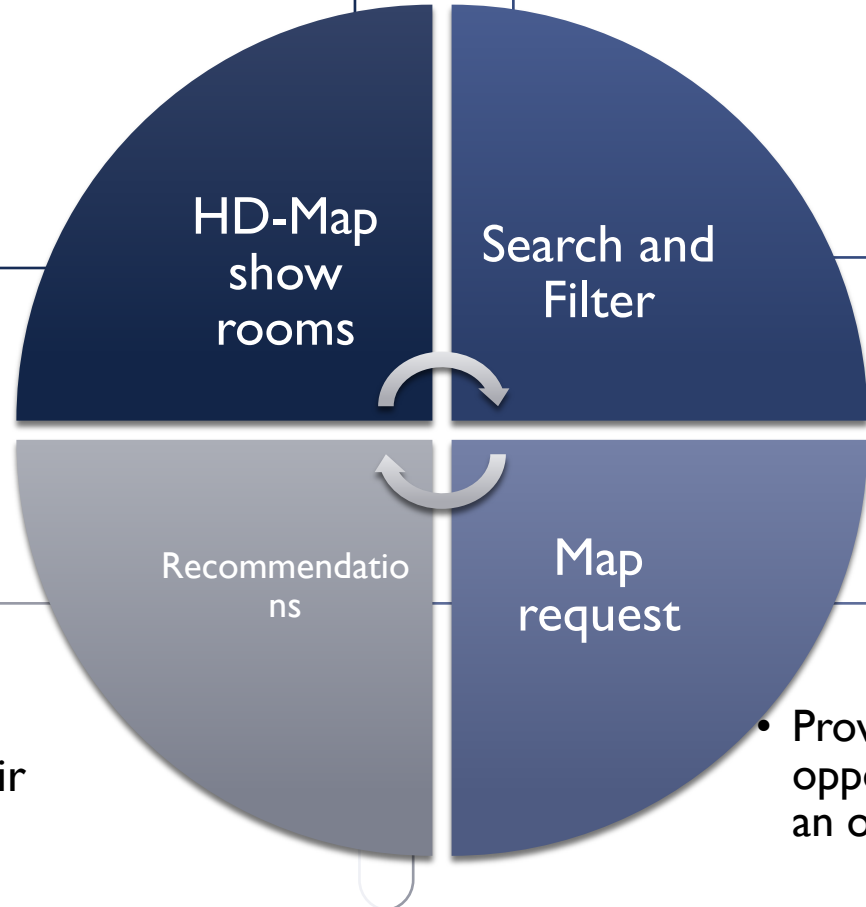
HD-MAP-MART (THE MARKETPLACE FOR HD-MAPS)



THE MARKETPLACE FOR HD-MAPS



- Providing Map providers with the adequate interface to show their data in their respective formats.



- Providing Map consumers with the interface to look through demo provider data categorized by sensor type, geographical location, and scale.

- Providing Map consumers with recommendations based on their location, purchase history, and company profile.

- Providing Map providers with business opportunities and offering Map consumers an on-demand HD-Mapping service



CHALLENGES IN 2023

CHALLENGES FOR AUTOMOTIVE HD-MAPPING FOR AUTONOMOUS VEHICLES





GuloGulo

AI Sensor fusion software for safer
automated/connected vehicles

Solution – Gulo Gulo

Gulo Gulo AI Sensor fusion software solution provides:

1

Most accurate positioning
(decimeter level)

Highest automated/connected vehicle navigation performance

2

Operation in All Environments

Works in urban canyons, Highway and indoor

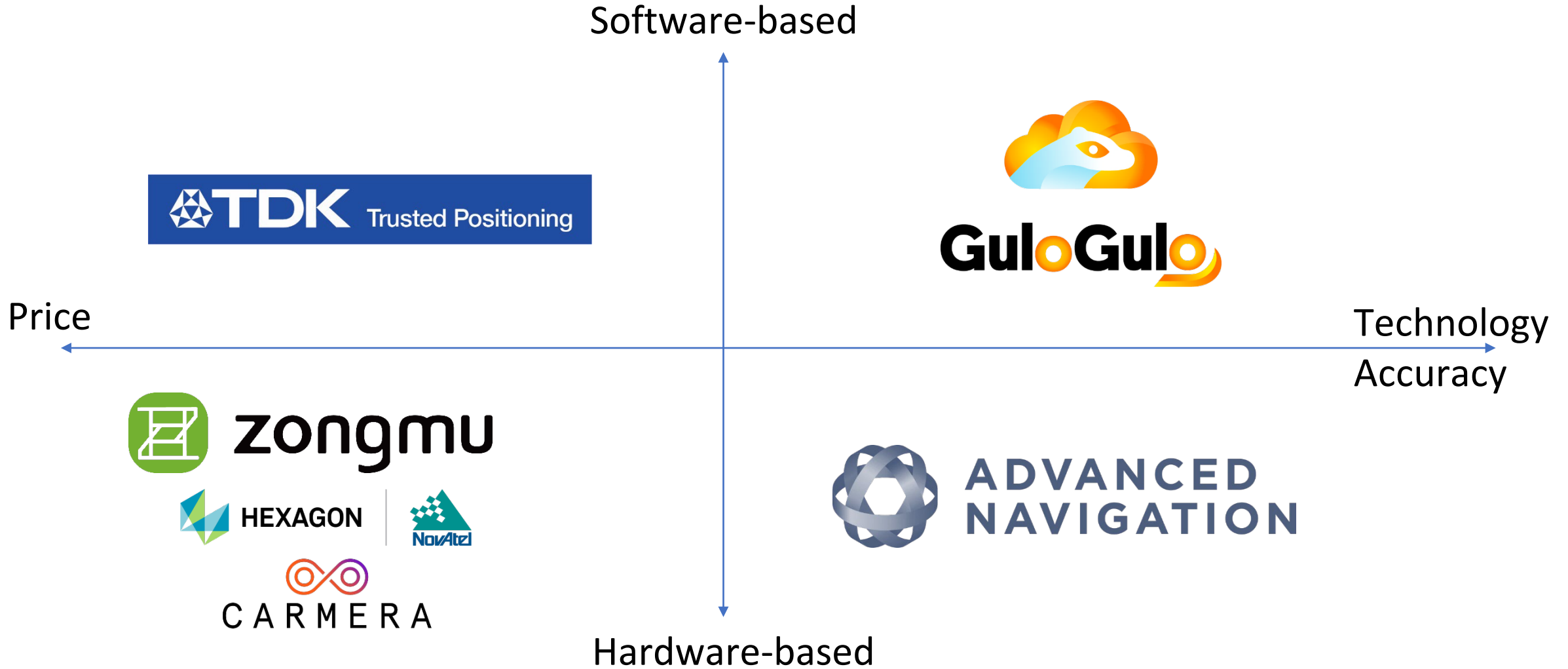
3

All-weather operation

The only solution to work in rain, snow, and fog

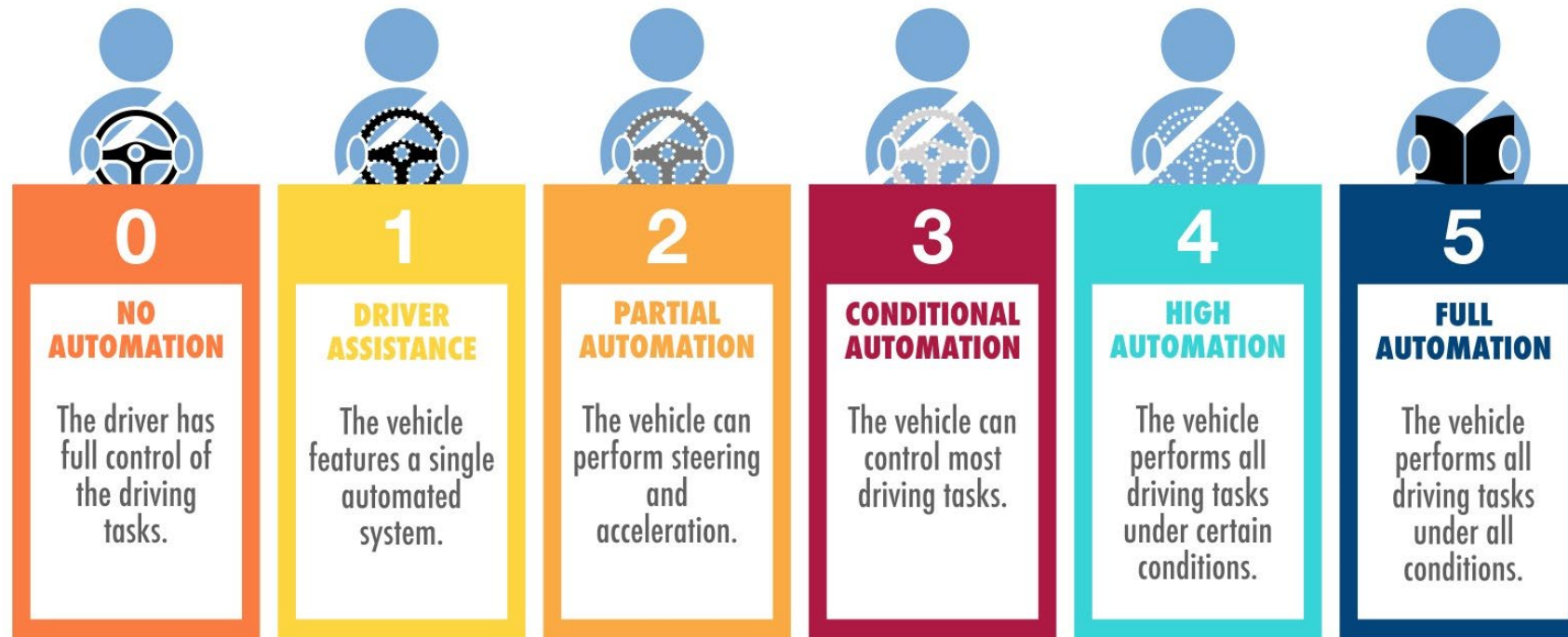


Competition



TAXONOMY

LEVELS OF AUTONOMOUS DRIVING

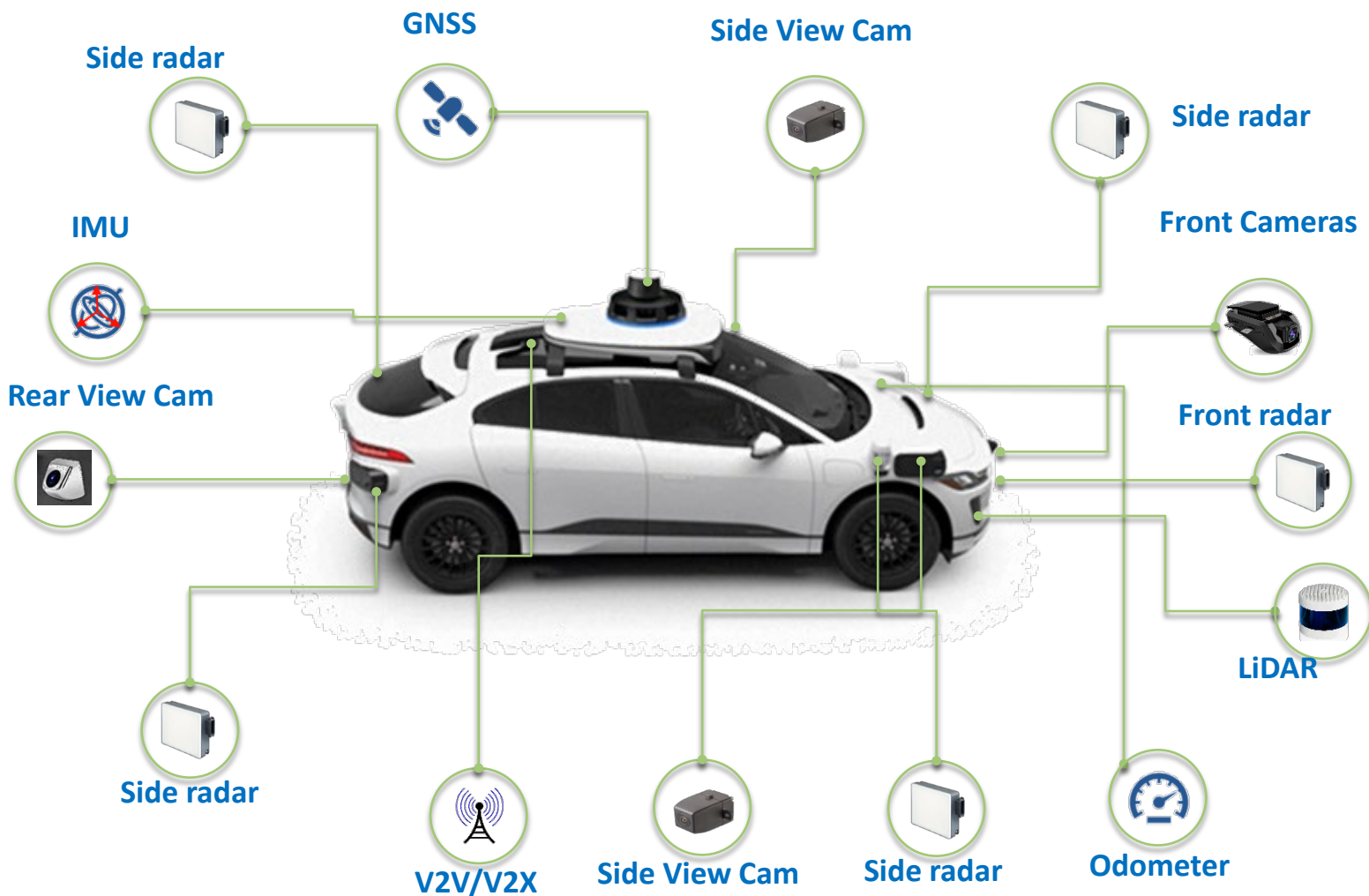


AUTONOMY METRICS AND DEFINITIONS

- Accuracy
 - system error (~95% for L3+)
- Integrity
 - knowing when the system is not reliable
- Continuity
 - uninterrupted function during operation
- Availability
 - compliance with Accuracy, Integrity, and Continuity requirements
- Resilience
 - maintaining Accuracy, Integrity, and Continuity requirements during operation



LEVEL-3 IS ON HOLD!



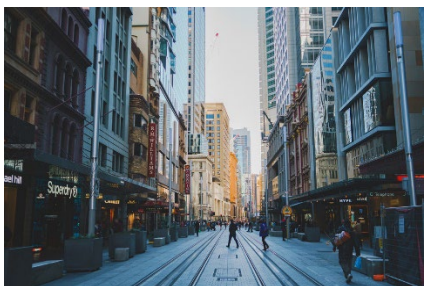
Today's vehicles are loaded with a heterogeneous set of sensors and systems,

But, what about autonomous navigation performance?



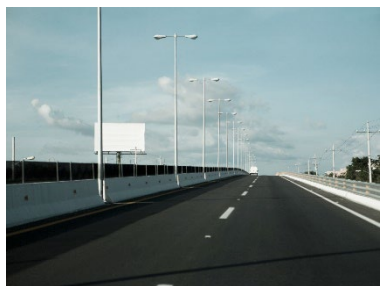
PROBLEM – CONTESTED ENVIRONMENTS

In urban canyons



GPS is suffering

On highways



All features look same, HD maps will fail

While snowing



Cameras and LiDAR will fail

During rain



Cameras and LiDAR will fail

Indoor/underground



No GPS and LiDAR is suffering

Accuracy



Integrity



Continuity



Availability



Resilience



AUTOMOTIVE POSITIONING SOLUTIONS

URBAN POSITIONING



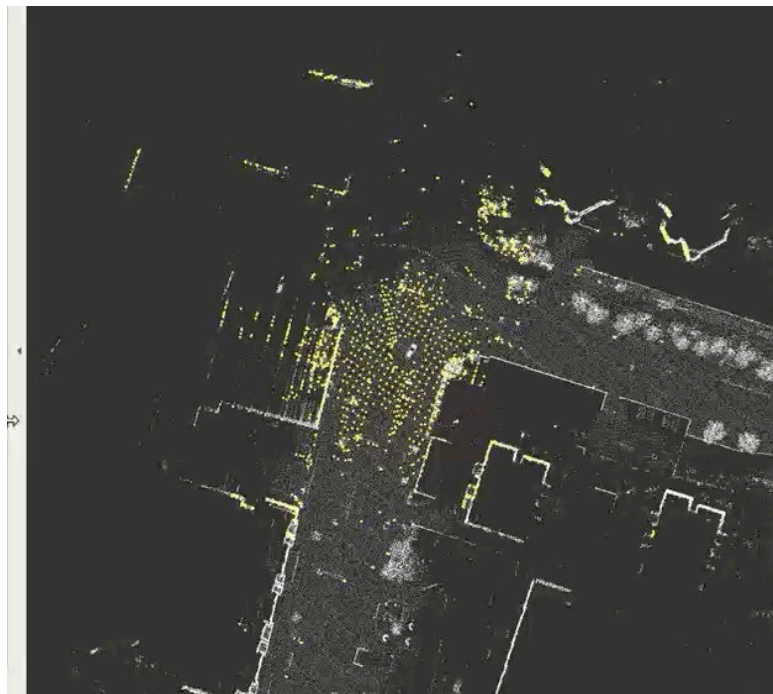
GuloGulo
UrbanNav



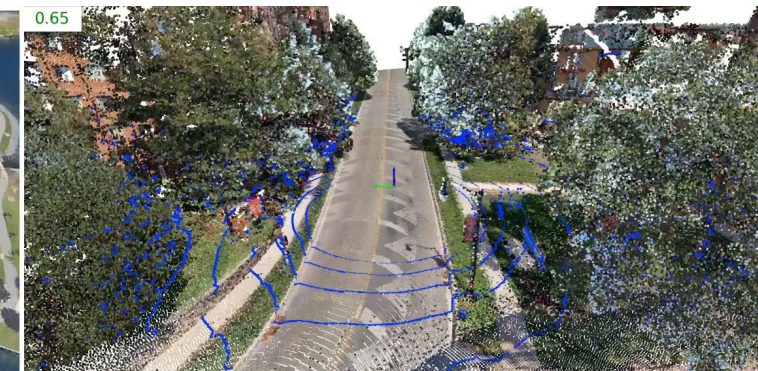
URBAN POSITIONING

- METI's UrbanNav solution offers continuous decimeter level low-cost perception-based (LiDAR/ Cameras/ Electronic Scanning Radars) positioning.
- integrating available 3D/HD maps in dense urban areas and downtown cores with high-rise buildings in all environments and all weather conditions. The Gulo Gulo UrbanNav optimizes the redundancy of sensors.

HD-Map-aided
LiDAR-based
positioning
(Finland)



	STD (m)	RMSE (m)
Relative Position Error	0.44	0.97

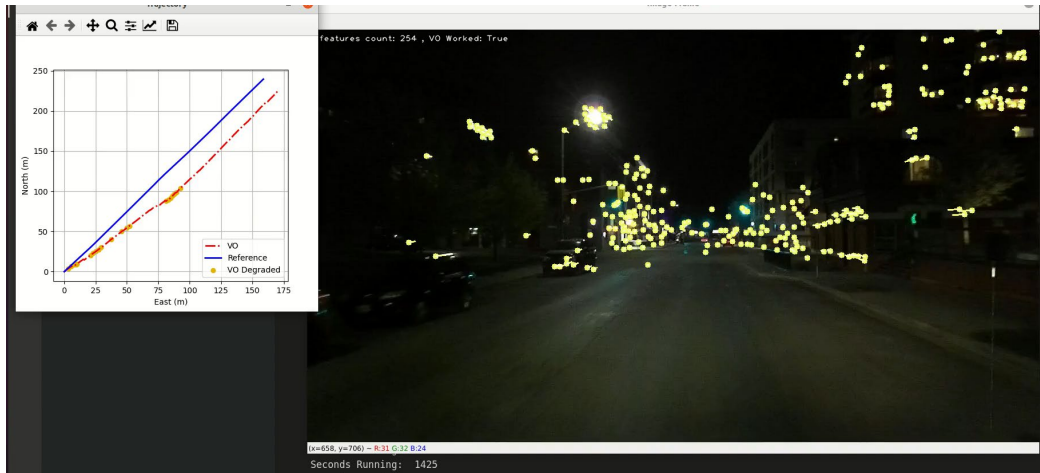


HD-Map-aided LiDAR-based positioning
(Canada)

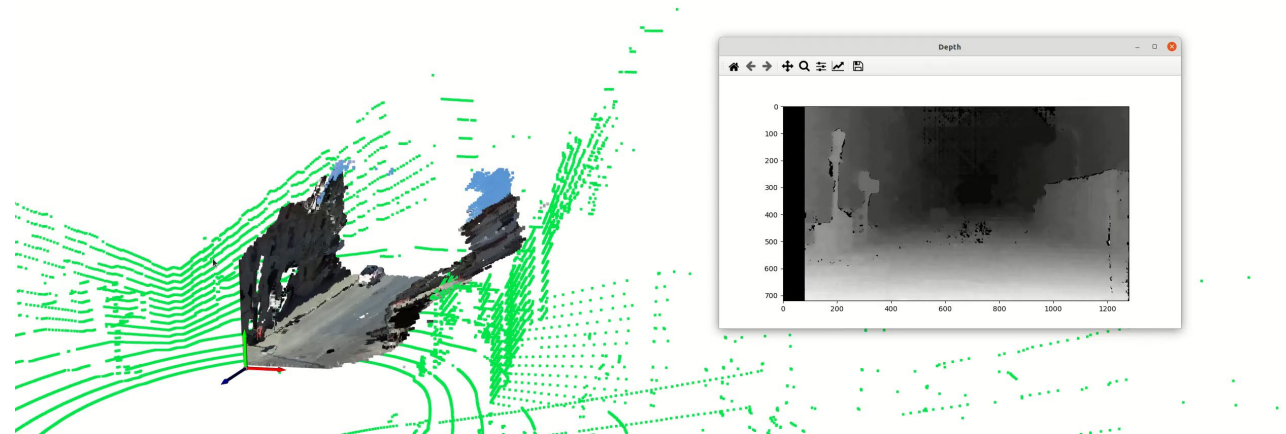
Horizontal RMSE	0.62 m
Vertical RMSE	0.196 m
Sub-meter accuracy	95.43 %
Lane-level accuracy	99.5%

URBAN POSITIONING

- METI's Camera-based solutions provide camera integrations with several sensors, e.g. LiDAR and INS.



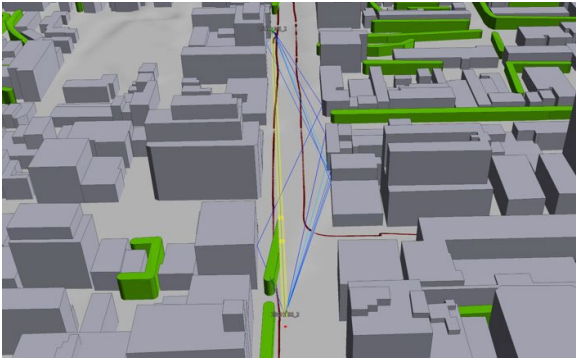
Standalone Camera Night positioning solution



Integrated Camera-LiDAR fusion positioning solution

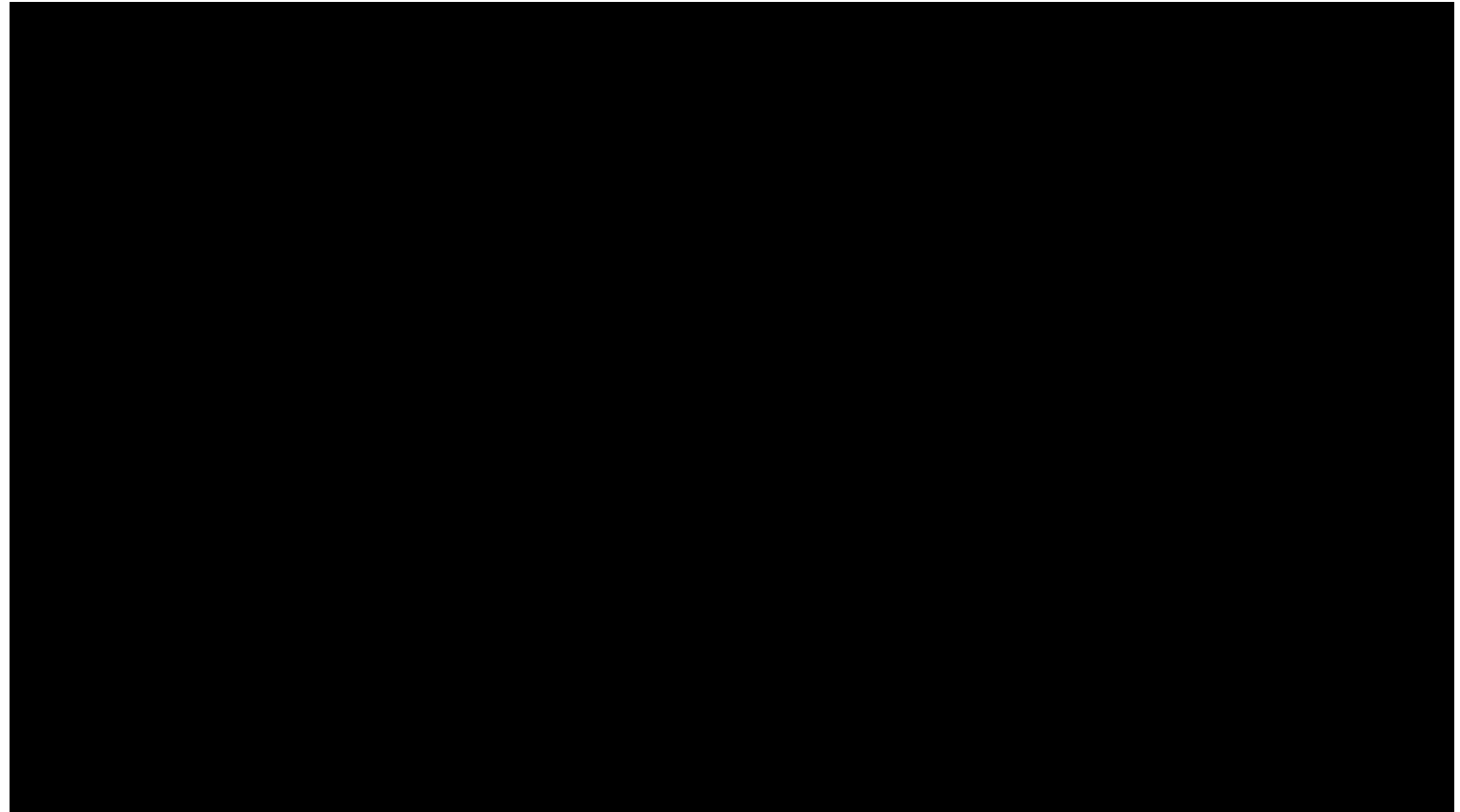
URBAN POSITIONING

- METI's new proprietary technology for mmWave positioning has been developed to be useful in the Urban outdoor scenario and in the indoor underground garages.



mmWave positioning simulation tests
(Canada)

	Gulo Gulo 5G positioning
RMS Error	0.3m
Sub-1m %	94%
Sub-30cm %	92%



AUTOMOTIVE POSITIONING SOLUTIONS

INDOOR POSITIONING

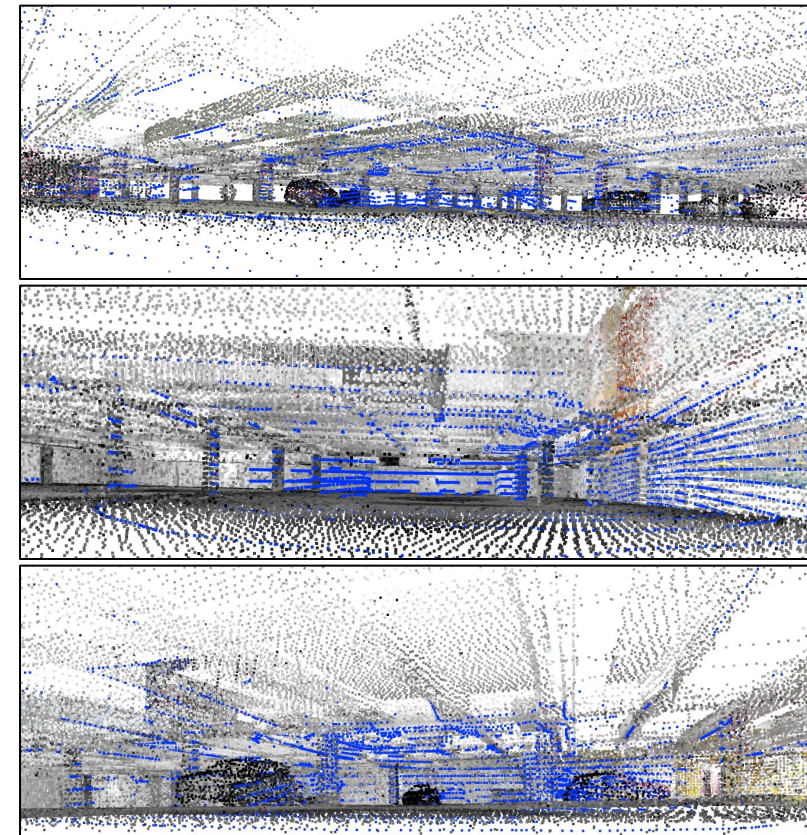
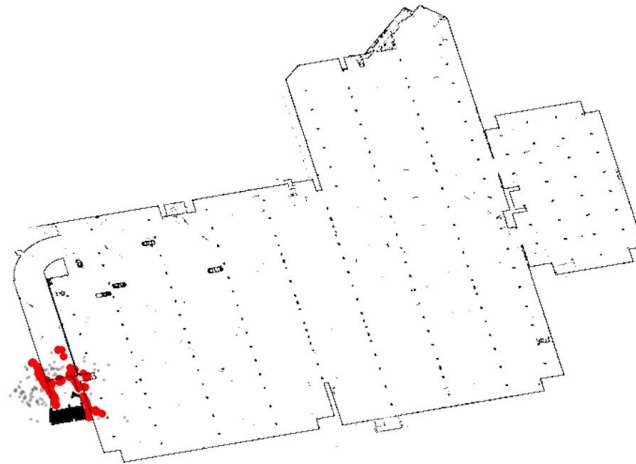


GuloGulo
IndoorNav



INDOOR POSITIONING

- METI Indoor positioning solutions offer continuous decimeter level low-cost perception-based (mmWave & Electronic Scanning Radars) positioning in indoor environments, integrating available 3D/HD maps when available.



Indoor positioning using Radar-based positioning
(Canada)

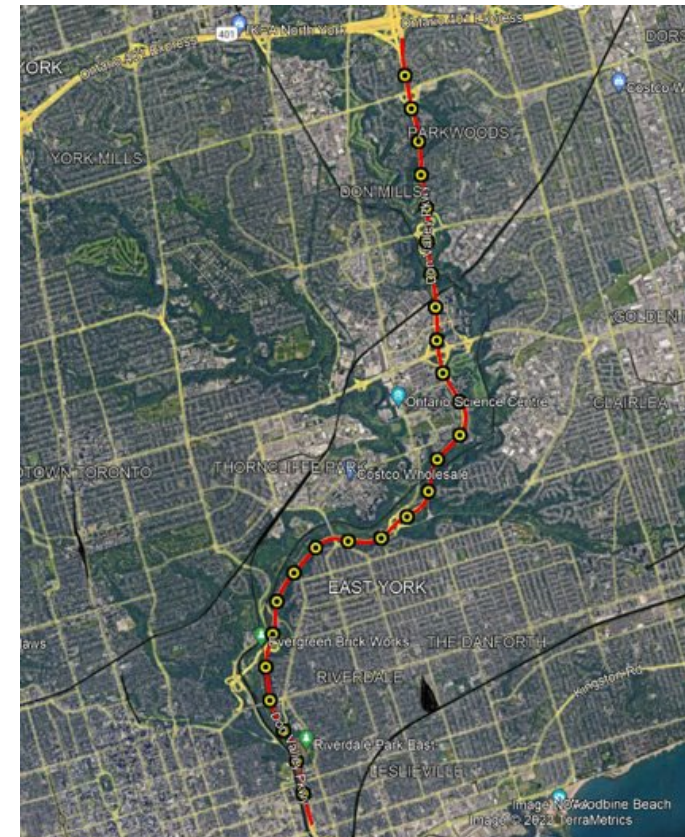
AUTOMOTIVE POSITIONING SOLUTIONS

HIGHWAY POSITIONING



HIGHWAY POSITIONING

- METI's mmWave solutions provide the optimum solution for a highway driving scenario.



AUTOMOTIVE POSITIONING SOLUTIONS

MACHINE-INTELLIGENT ENGINE FOR ADAPTIVE POSITIONING



COGNITIVE SITUATION AWARENESS

- METI started testing with situational awareness on the camera stream to detect and enhance input image stream for visual-based navigation algorithms.
- METI solutions can enhance the positioning accuracy in Fog, rain, and night conditions.
- Further enhancements to snowy weather and environment are ongoing with our European partners.

fog and night and rain

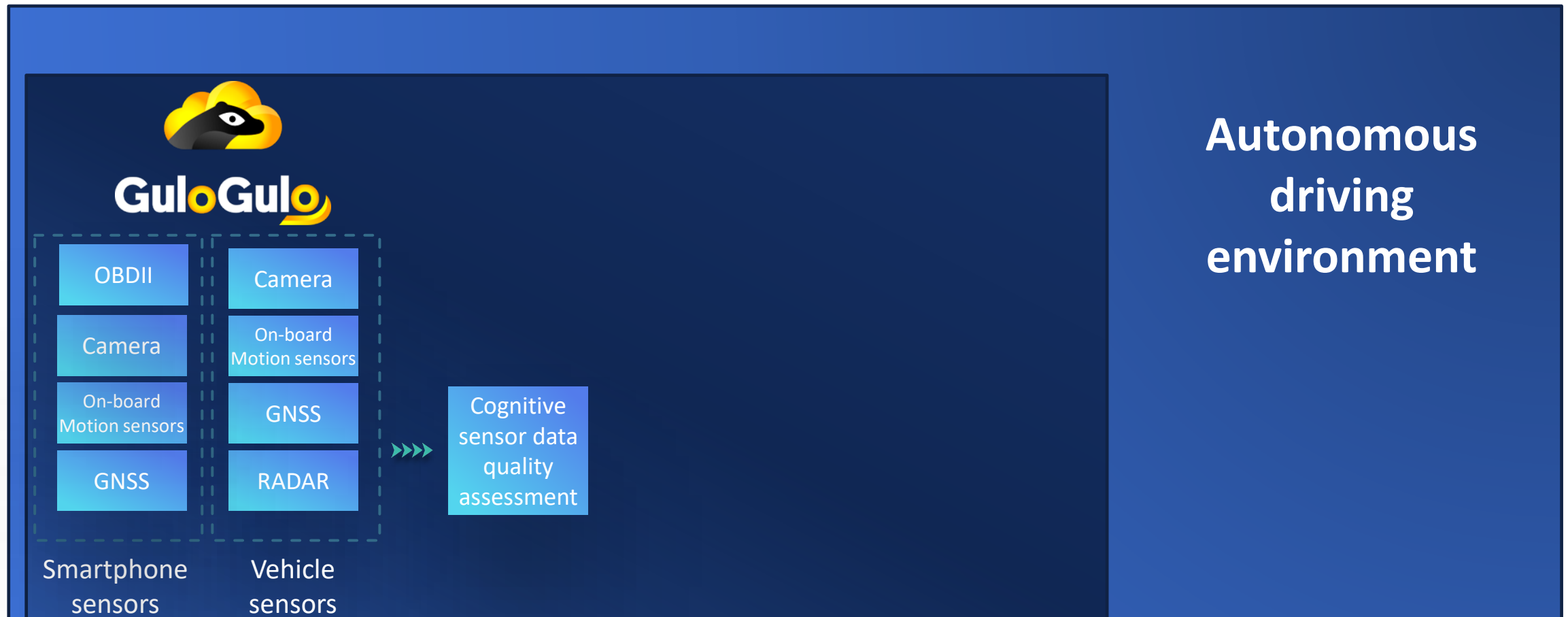
MI ENGINE ARCHITECTURE

Sensor data is received by the vehicle's sensors



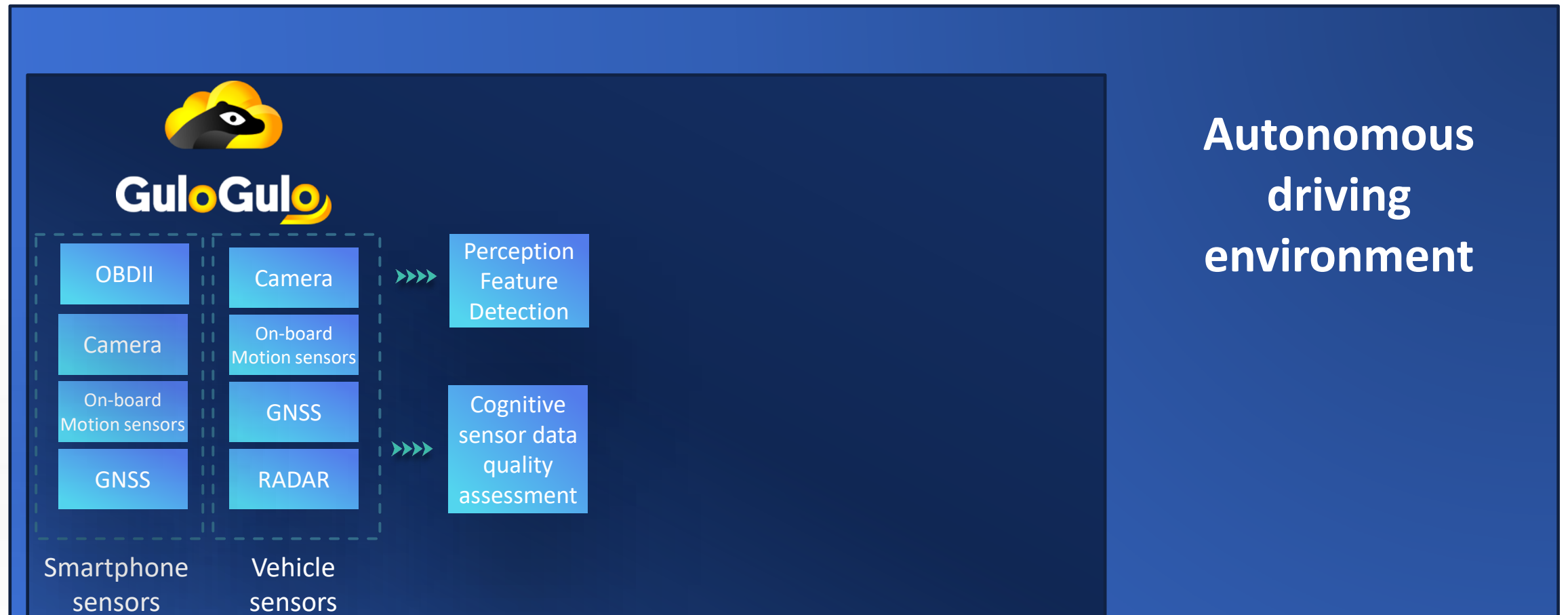
MI ENGINE ARCHITECTURE

The data is then evaluated for noise sources and enhanced if possible using our situational awareness AI models



MI ENGINE ARCHITECTURE

Sensor data are used to extract environment features detected in the surrounding environment



MI ENGINE ARCHITECTURE

AI models are then used to classify the detected global and local features in the perception sensors

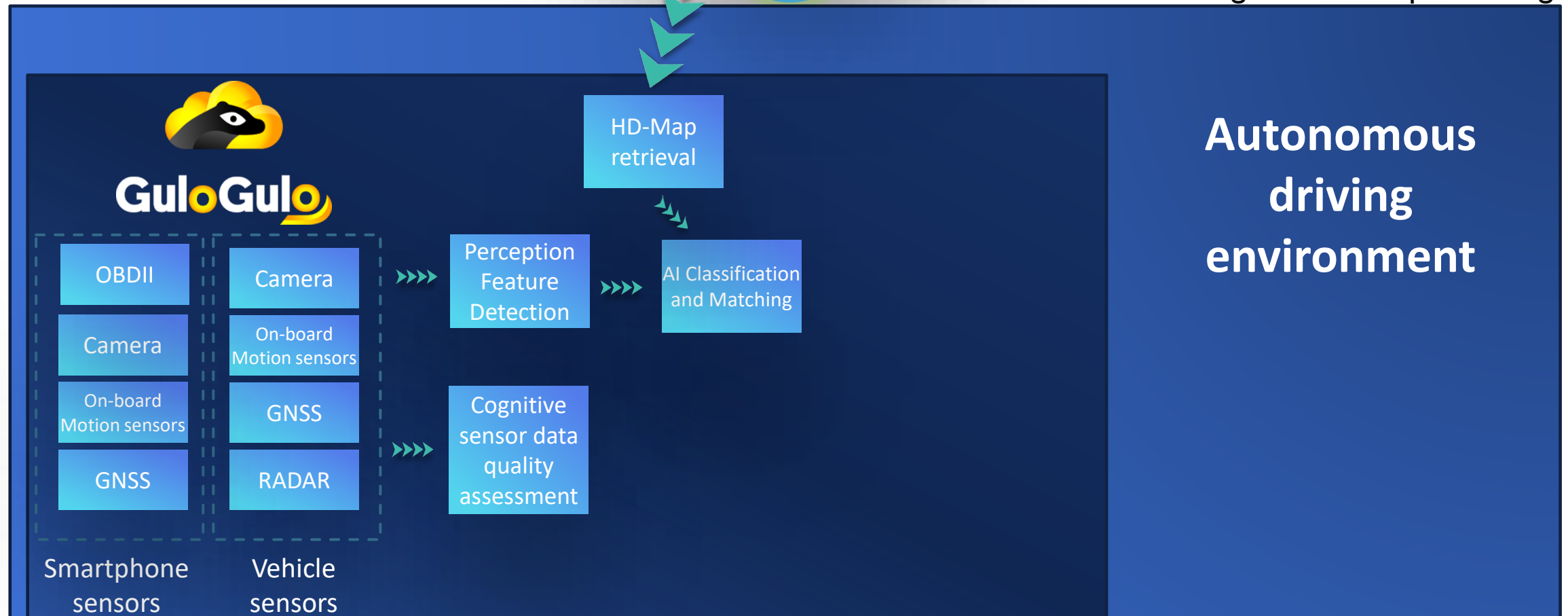


MI ENGINE ARCHITECTURE

Cloud-based service

HD-Map

Cloud-based HD-Map data retrieval is essential for the feature matching and vehicle positioning

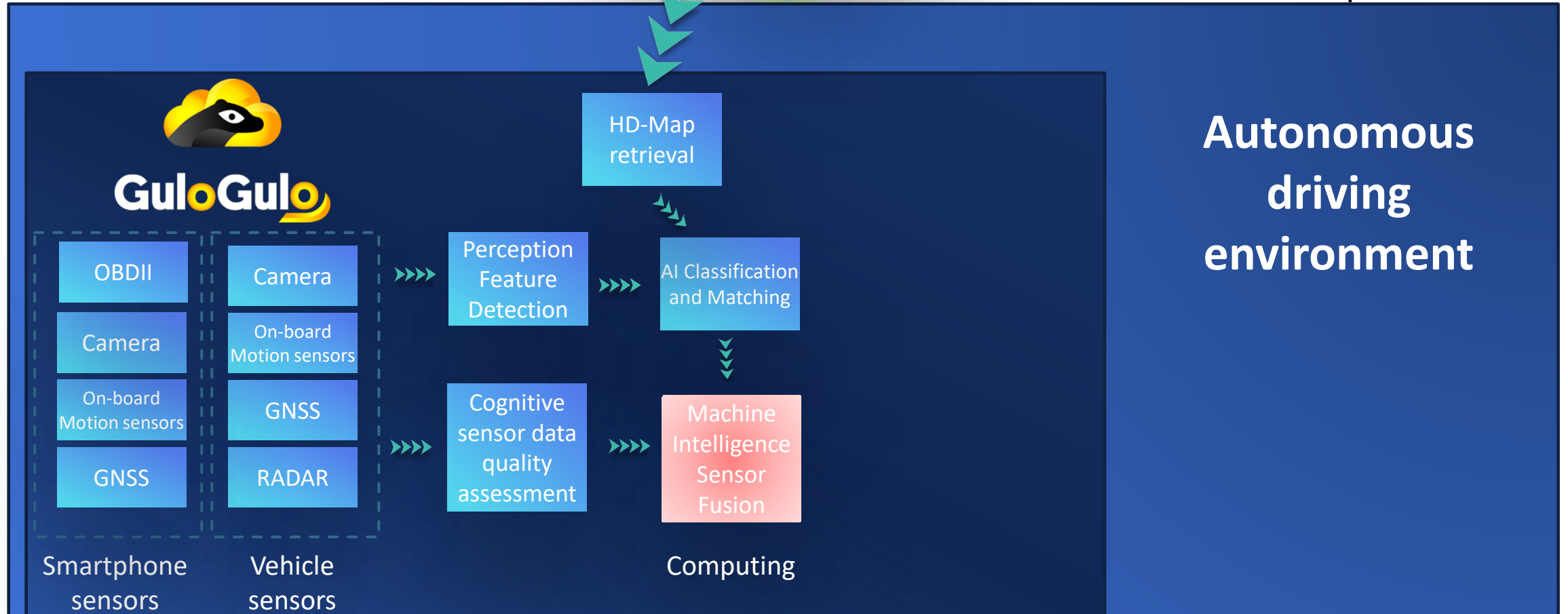


MI ENGINE ARCHITECTURE

Cloud-based service

HD-Map

The Machine-Intelligent Engine decides on which data source to use for the vehicle position estimation

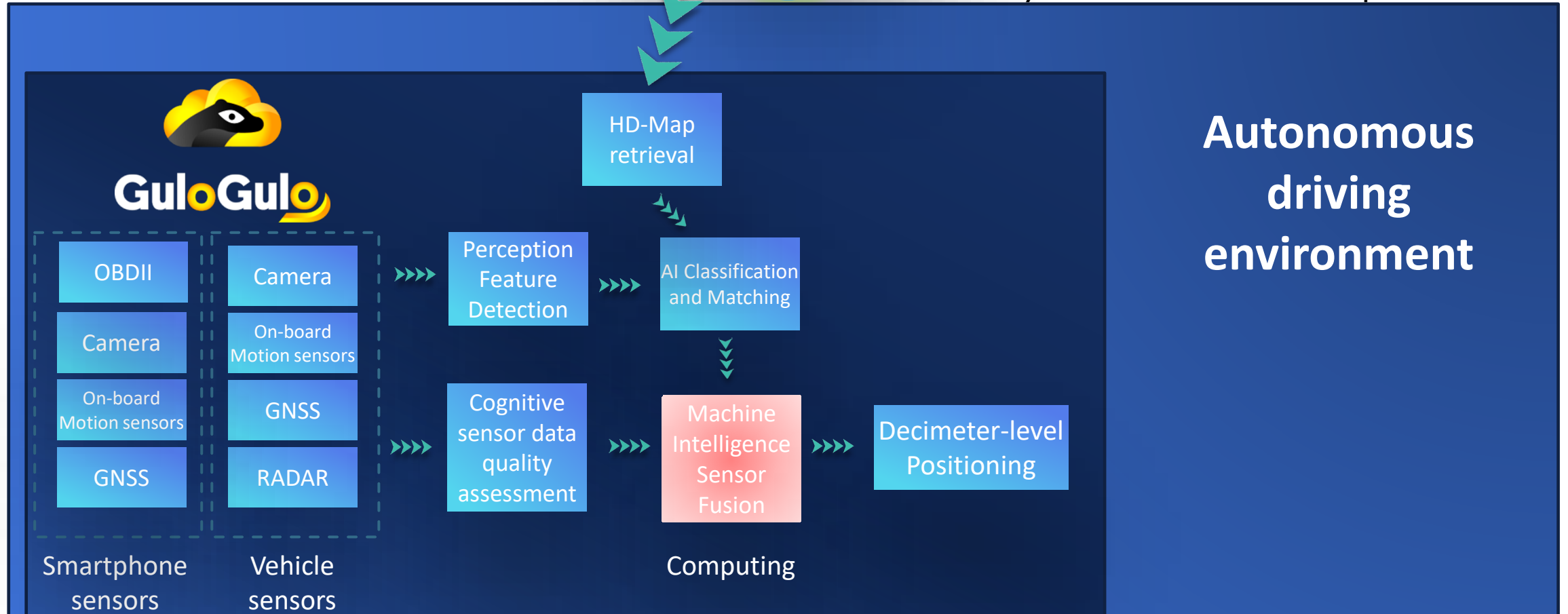


MI ENGINE ARCHITECTURE

Cloud-based service

HD-Map

An accurate position estimation is inferred based on the healthy sensor data and HD-Map matched features

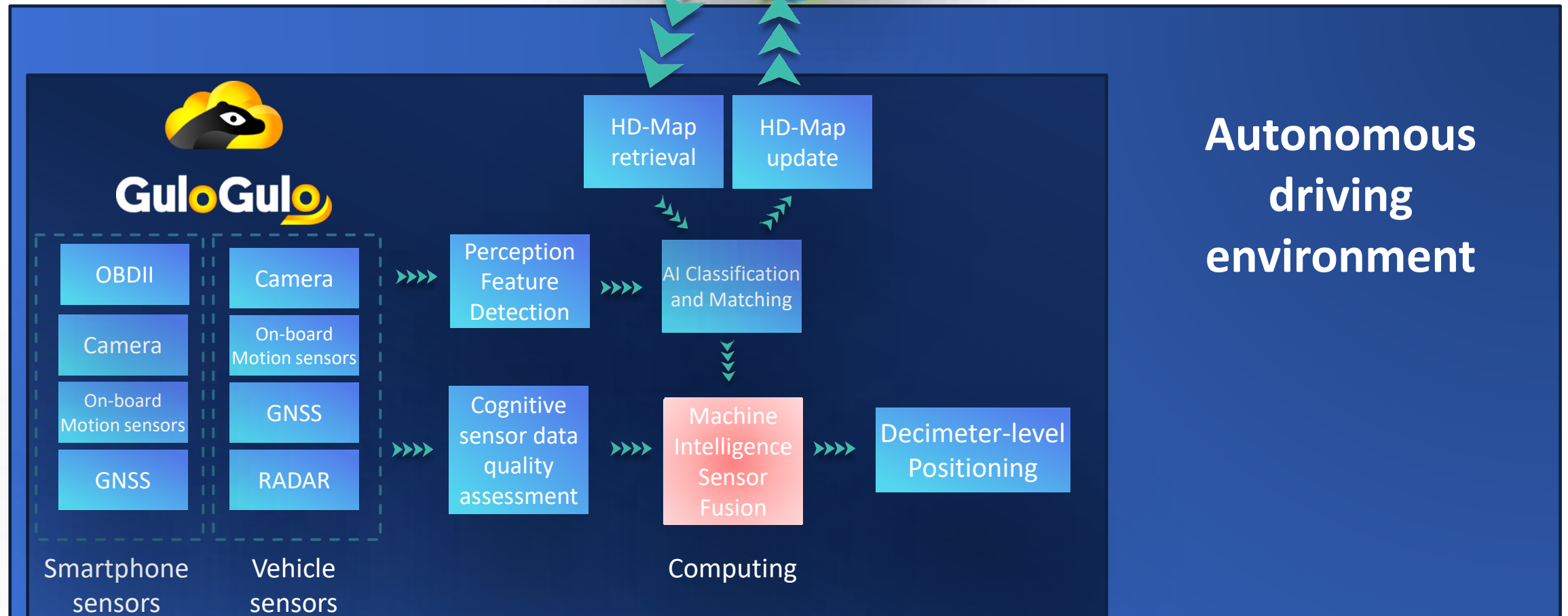


MI ENGINE ARCHITECTURE

Cloud-based service

HD-Map

HD-Maps are updated with updates to new/modified feature locations

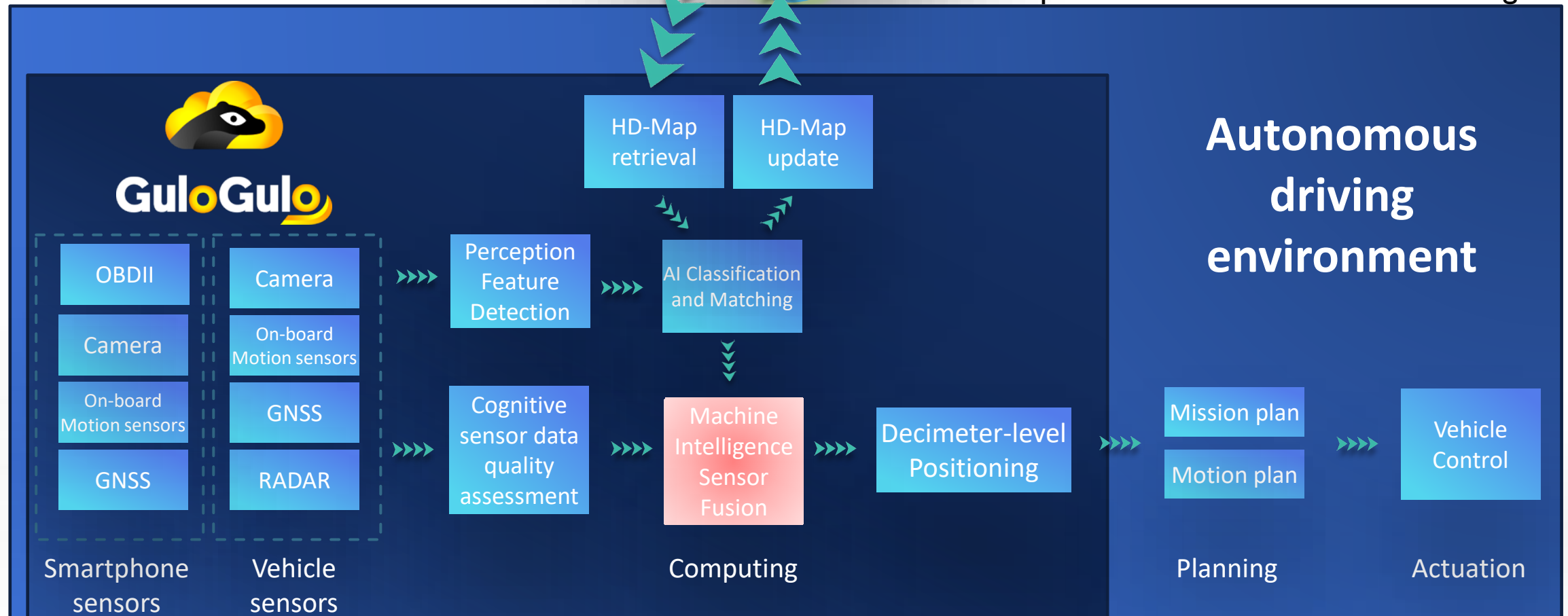


MI ENGINE ARCHITECTURE

Cloud-based service

HD-Map

The vehicle position estimation is then used for providing accurate position for the autonomous driving function



Mitacs

ALBERTA 
INNOVATES

NRC-IRAP



NVIDIA.

INCEPTION
PROGRAM



METI

MICRO ENGINEERING TECH INC.

Innovation in Process Controls



ASTech
Foundation
Inspiring Innovation



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