Boosting driver awareness, comfort and safety with enhanced ADAS

A clearer road ahead with location technology

here

for location

Building confidence as automation increases

Automated driving technology is advancing fast, but today's assistance features aren't always trusted. To clear the way for higher levels of automation, this barrier must be overcome. Automakers need drivers to have confidence in the safety of their systems.

One way to grow confidence is through the improved reliability of Advanced Driver Assistance Systems (ADAS). **HERE helps improve ADAS** by complementing existing in-vehicle sensors with data on road topology, rules and layouts, weather conditions, traffic, hazards and more.

Data of this kind enables a better driver experience – even in bad weather – and helps automakers conform to upcoming safety regulations.

Read on to find out how you can increase **driver awareness, comfort** and **safety** with HERE location technology – and build confidence in an autonomous future.

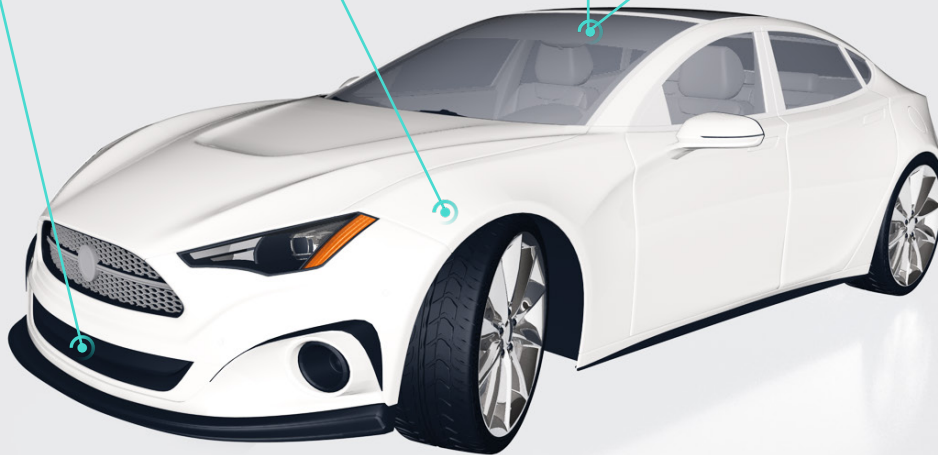**Want to talk?** We do, too. Get in touch here.

Mitigate sensor limitation

Sensors provide information on the activity they see. They're blind to everything else. Bad weather can also limit their functionality. The addition of location information helps a vehicle overcome these shortcomings, look beyond its sensors, and benefit from an enhanced ADAS.

Limits of sensor functionality

RADAR
Measures distance with radio waves

(+) Better performance in bad weather

Works over long distances

(−) Struggles to differentiate between nearby objects

ULTRASONIC PARKING SENSORS
Measures distance with sound waves

(+) Low cost

Good for short distance uses, like parking functions

(−) Only for low-speed, short-distance applications

VIDEO CAMERA
Provides visuals for basic ADAS

(+) Low cost and versatile

Easy for drivers to interpret

(−) Unreliable in bad weather

Short range

LiDAR
Measures distance with a pulsed laser

(+) Assesses objects in detail

(−) Unreliable in bad weather

Large and expensive

Short range: about 100 meters

Many moving parts

How location technology enhances sensor data

→ Location technology sees beyond the limited range of sensors to provide data on conditions ahead

→ Map and real-time data is not impacted by bad weather, making ADAS more reliable

→ Road topology, geometry and buildings add context for more accurate positioning

→ Overlapping map and sensor data adds redundancy into vehicle positioning

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Boosting awareness with real-time location technology

Despite improvements, the United States still endured ⬀ **6.8 million reported traffic crashes in 2019**. Automakers can help reduce these incidents by improving driver awareness with alerts to potential hazards like pedestrians, road damage and other vehicles.

Location technology is a powerful solution. Not only does HERE help ADAS warn drivers of potential hazards, it also helps drivers make more informed decisions with updates on traffic, signs, road rules and dangerous conditions.

Car sensors can't usually tell a driver about slippery roads, bad traffic or an accident ahead. However, the addition of location technology from HERE will keep drivers informed, in real time, of all of this and more.

Get live updates with HERE Real-Time Traffic

Drivers see detailed, accurate and real-time information about congestion and incidents, then can reroute quickly.

Learn more
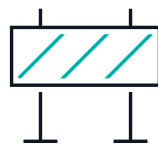
Know the rules with HERE Road Signs

Crowdsourced sensor data gives real-time speed limits information and keeps in-vehicle maps up to date.

Learn more

See round corners with HERE Hazard Warnings

Drivers get alerts about upcoming dangerous road conditions to ensure fewer surprises.

Learn more

Identify hazards with HERE Live Sense SDK

Camera-enabled devices identify potential hazards – like other vehicles, bikes, pedestrians and potholes.

Learn more

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Helping Ford Puma drivers stay aware

Ford of Europe now offers a ⧉ **safer driving experience** in the new Ford Puma.

Ford of Europe created a local hazard warning service for drivers, with easy-to-integrate location technology from HERE. The service alerts drivers to hazards, accidents and dangerous conditions – with data crowdsourced from millions of connected vehicles.

Ford needed: To increase driver awareness, comfort and safety with hazard information

HERE delivered: Safety-relevant incident information for alerts and sensor data distribution

READ THE FORD CASE STUDY →

The results

→ **A first in the segment.** Ford Puma is the first in its segment to standardize hazard information.

→ **Enhanced technology** by adding industry-leading location intelligence.

→ **Faster innovation** with easy access to the latest location technology.

→ **Safer roads** alerts system and data exchange have potential to reduce incidents.

→ **Informed drivers** now they know upcoming road conditions.

Want a hazard warning service like Ford of Europe?

Using probe and event data to enhance traffic and hazard warning services can be a great step forward for any carmaker. To comply with privacy regulations, we can ⧉ **help with anonymization** and data enrichment.

ISA and ADAS - want to take driver awareness a step further?

New rules in the European Union mean Intelligent Speed Assistance (ISA) will be a mandatory requirement in 2022 for all new vehicle types and in 2024 for all new vehicles.

⧉ **HERE, Continental and Elektrobit** are working together on ISA solutions to support new passenger and commercial vehicles.

ISA systems use sensors and map data to identify the correct speed limit and notify drivers. If needed, it can also automatically limit speed.

Adding location technology can bring a host of additional benefits:

→ **Combining camera and map data** can improve the performance of ISA systems

→ HERE offers the **highest speed limit coverage and accuracy** on all road types in the EU, based on a HERE-commissioned study on speed limits in 21 EU countries end of 2020

→ **Commercial vehicles** can be supported alongside cars, but with truck-specific attributes

→ **Gain flexibility** on top of our standard offers with our professional services to help build easily scalable solutions

→ With the ⧉ **HERE platform**, our ISA offering can be extended to **support more complex driver assistance systems**

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Enhancing comfort with predictive adaptive cruise control

Adaptive cruise control (ACC) enhances comfort by using radar sensors to feed back data so speeds can be altered to suit road conditions.

When the ACC understands the geometry and infrastructure of the road ahead, it becomes proactive. For this you need accurate and detailed maps.

The underlying maps need to be reliable, highly detailed and constantly updated. HERE provides this vehicle intelligence through its accurate, real-time positioning information and awareness of traffic and infrastructure. We offer the leading map data and platform to help enhance driving experiences.

Maps like this provide detailed road, lane and traffic information about the road ahead. This allows predictive ACC to reduce speed before reaching road elements like sharp curves, roundabouts and speed limit changes – to give drivers a better sense of safety and control.

Road attributes
Curvature 957m
Slope 2.6°

Road attributes
Curvature -15m
Slope -2.2°

Acceleration
Incline ahead
8kph

Smoother bends

A car needs to know more than a bend's location to traverse it smoothly. HERE provides accurate curvature information to help vehicles enter, round, and leave at a comfortable and safe speed.

More even climbs

For full driver comfort, predictive is better than reactive. HERE offers detailed elevation and slope information across the entire journey so a car can smoothly adapt its speed to suit the gradient – without sudden adjustments.

Roadway knowledge

Knowing what's coming helps drivers increase their awareness and comfort. HERE delivers fresh road sign information directly from the cloud, as well as speed limit data to support ISA compliance, temporary and variable speed, permanent road works and lane closure signs.

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Increasing safety through better lane-keeping assist

Lane keeping can benefit from a better understanding of a vehicle's immediate environment.

When lines are obscured, the system might not be able to calculate lane widths. This could cause dangerous steering interventions.

Lateral ADAS functions (those that locate a car in a lane) need lots of information – lane width, number of lanes, direction of travel, lane markings, access rights and any details on restrictions. In snow, camera-only systems struggle – they look for lane lines, try to calculate the width, work out the center and say, "this is where I need to stay." If those systems can't see the lines, they won't work properly.

By providing ↗ **lane information**, HERE helps cameras know the lane location, the number of lanes, their width, centerline and the direction of travel. This can improve the reliability and accuracy of lane-keeping assistants (LKAs) – and the safety of the driver.

By providing lane information, HERE helps improve the reliability, accuracy and safety of lane-keeping assist.

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HERE Lanes: providing lane information, independent of cameras

HERE Lanes is a detailed lane model that makes SAE Level 1 and Level 2 lane-keeping assistance more reliable. It helps drivers feel safer and more likely to trust automated driving.

HERE Lanes enables lane-level guidance with rich visuals, enhanced routing and numerous ADAS applications. HERE Lanes can be integrated into in-dashboard systems, head-up displays (HuDs) and augmented reality HuDs.
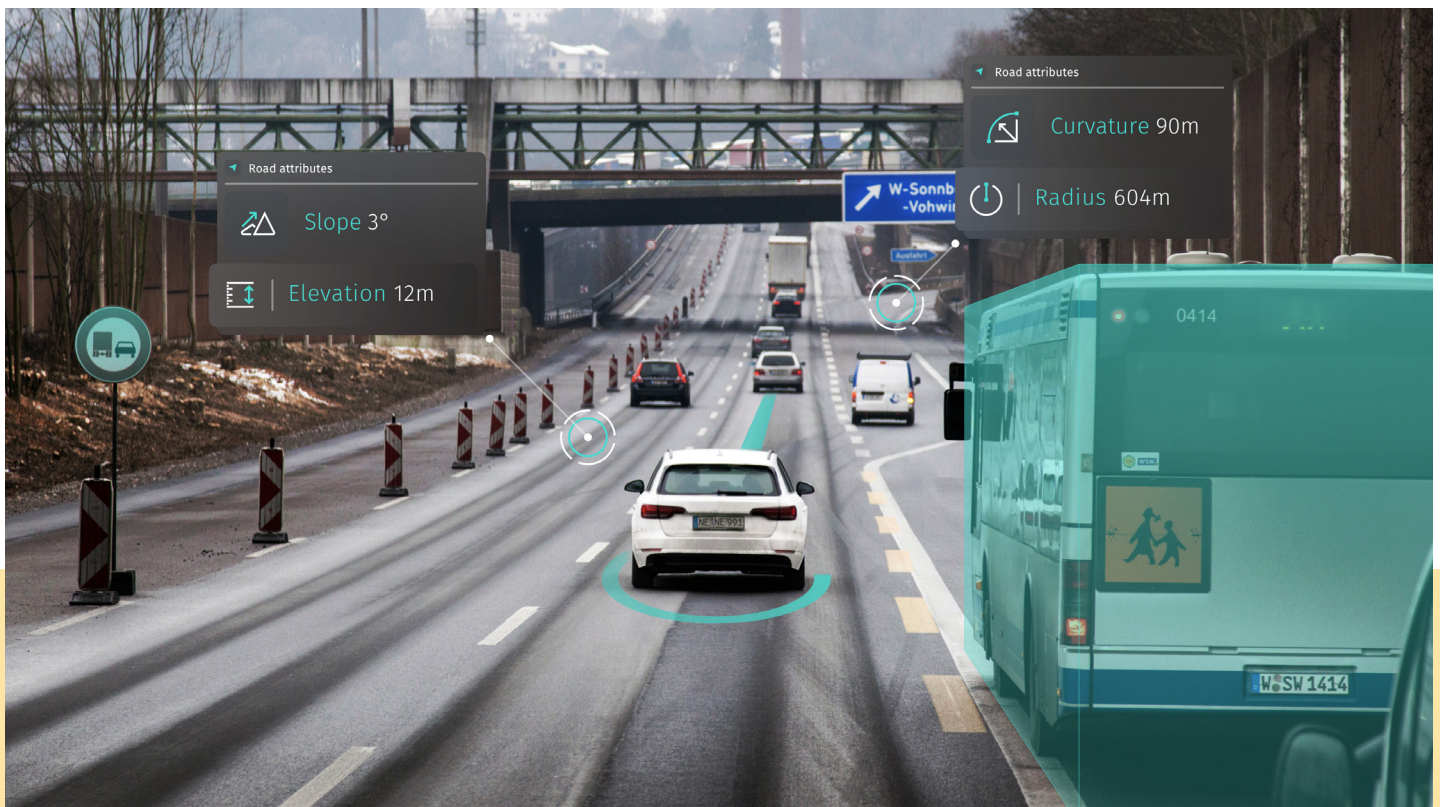
HERE Lanes offers:

→ Lane model with **lane topology and geometry** – lane count, direction of travel, lane connectivity, lane boundaries and lane drive path/centerline

→ **Lane attributes -** HERE supplies information on a number of lane elements, including lane marking style, lane type and access characteristics.

→ IInformation on all **turn lanes and traffic islands** to help increase clarity and to make drivers feel safer

→ Help with **collision mitigation** with information on lanes with cross front traffic and restrictions on lane changing

→ Supports for **safer driving** – assisting lane changes on highways, smoother acceleration and braking, lane merging, turning and lane keeping

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Paving the way to higher levels of automation

Some companies want to achieve high levels of automated driving by relying on sensor data alone. HERE believes that for these systems to function at their best, maps of superior accuracy and quality will be a crucial component.

Only a car combining a detailed map of its environment with accurate positioning information will enable a truly autonomous world. If the car wants to play a role in the wider traffic and infrastructure ecosystem, it will need a map that's always up to date. In effect, cars will need live maps.

HERE ⬈ HD Live Map: combining data from multiple sources for a self-healing map

The HERE HD Live Map provides extremely detailed roadway information that works with sensor input to help vehicles understand their lane-level location and make safe decisions.

The map uses data from multiple sources. It's based in the cloud and has three layers that provide a trusted foundation for a more autonomous future.

Road Model: global coverage of road network information - like high-occupancy vehicle lanes, country-specific classification, topology, speed limits, curvature, slope, heading and elevation data.

HD Lane Model: lane-level detail to help self-driving vehicles make better decisions – lane topology, geometry, direction of travel, type, boundary and marking types.

HD Localization Model: uses identifiable man-made objects like guardrails, barriers, gantries, stoplights and signs to position the car on the road or determine the lane in which it's traveling. This provides lane clarity and localizes a vehicle to within centimeters.

How does a map heal itself?

Using multiple data sources means fast change detection and updates. The HD Live Map merges data from varied sensor types with satellite imagery to eliminate errors that might be inherent in single sensor solutions. This provides greater reliability. The HERE self-healing approach is built on rich sensor data supplied from fleets of many different automakers.

What is the Quality Index?

It provides vehicles with superior transparency to help them make better, more reliable decisions. The Quality Index scores each feature that is detected by a sensor – things like road signs, lane markings, etc. The score reflects the predicted quality of the data regarding existence, accuracy and classification of the object. Vehicles then consider these scores as their HAD systems make decisions.

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OneMap Alliance –
a global system for
autonomous vehicles

HERE Technologies and others are dedicated to the creation of a ⬈ **global and dynamic high-definition map** aligned to the standards and specifications of HERE HD Live Map.

The aim for this consistent, HD map is that it will cross regions when automakers start offering vehicles with more advanced ADAS features and high levels of automation. The OneMap Alliance is open to new, strategic partners who are able to shape the future of automated driving.

A platform-centric approach

The HERE platform helps carmakers maximize the value of their data in a secure environment, while retaining control. The platform enables carmakers to:

Model & visualize

Create custom interactive maps, visualize geospatial data and perform ad-hoc analytics – no coding required

Develop & execute

Create, deploy and scale location-centric data services and perform complex analytics – in one collaborative environment
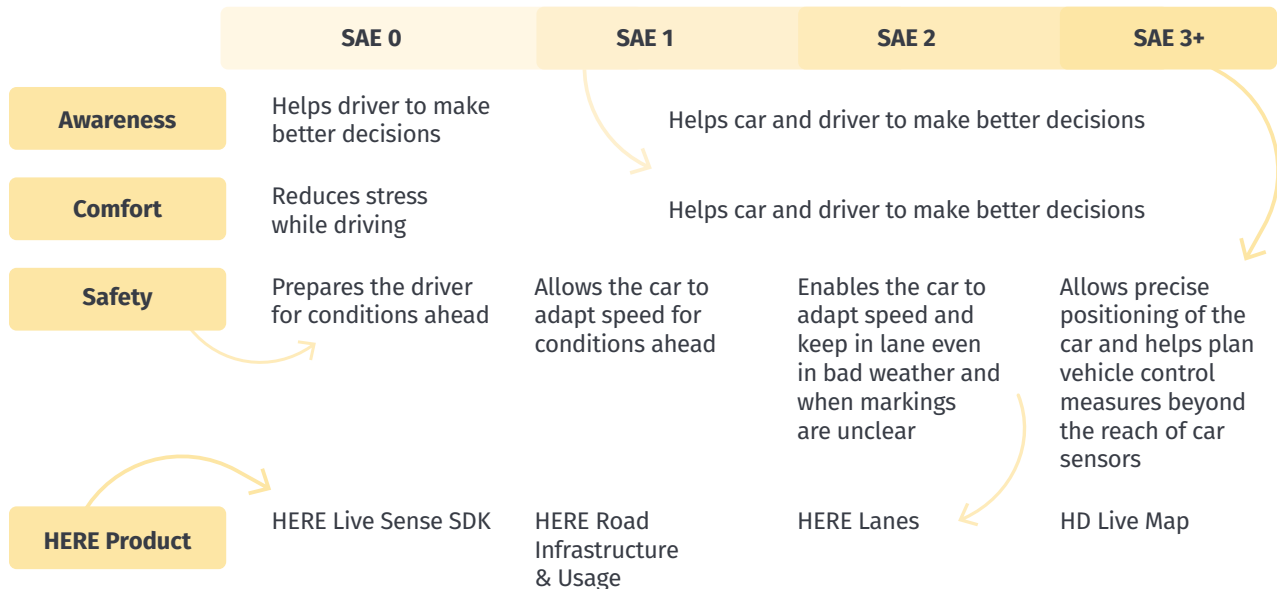
Exchange & monetize

Buy, sell and share a wide variety of location-centric assets, such as data and SDKs, in a secure exchange platform

By bringing our data, products, services and platform together into a single source, we make it simpler for carmakers to work with location technology to expand their offerings.

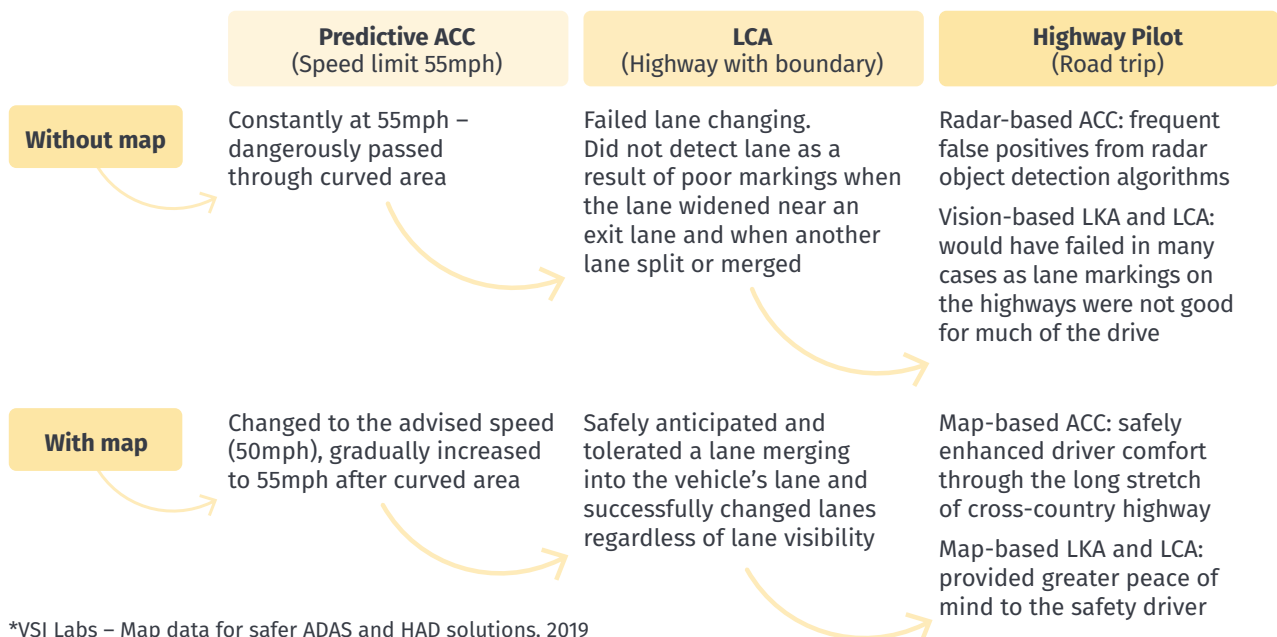**Want to talk?** We do, too. Get in touch here.

How maps enhance ADAS: now and in the future

Location data and high-quality maps can enhance awareness, comfort and safety for ADAS and help these systems mature into the higher-level automation of tomorrow.

	SAE 0	SAE 1	SAE 2	SAE 3+
Awareness	Helps driver to make better decisions	Helps car and driver to make better decisions		
Comfort	Reduces stress while driving	Helps car and driver to make better decisions		
Safety	Prepares the driver for conditions ahead	Allows the car to adapt speed for conditions ahead	Enables the car to adapt speed and keep in lane even in bad weather and when markings are unclear	Allows precise positioning of the car and helps plan vehicle control measures beyond the reach of car sensors
HERE Product	HERE Live Sense SDK	HERE Road Infrastructure & Usage	HERE Lanes	HD Live Map

Proving the concept: testing common ADAS functions with and without map data

VSI Labs* carried out real-world ADAS tests to learn if HERE HD Live Map could improve vehicle performance to boost driver awareness, comfort and safety. The tests judged if integrating the map into ACC, lane changing assist (LCA) and into a piloted driving system used on a 2,000-mile road trip would improve operations.

	Predictive ACC (Speed limit 55mph)	LCA (Highway with boundary)	Highway Pilot (Road trip)
Without map	Constantly at 55mph – dangerously passed through curved area	Failed lane changing. Did not detect lane as a result of poor markings when the lane widened near an exit lane and when another lane split or merged	Radar-based ACC: frequent false positives from radar object detection algorithms Vision-based LKA and LCA: would have failed in many cases as lane markings on the highways were not good for much of the drive
With map	Changed to the advised speed (50mph), gradually increased to 55mph after curved area	Safely anticipated and tolerated a lane merging into the vehicle's lane and successfully changed lanes regardless of lane visibility	Map-based ACC: safely enhanced driver comfort through the long stretch of cross-country highway Map-based LKA and LCA: provided greater peace of mind to the safety driver

*VSI Labs – Map data for safer ADAS and HAD solutions, 2019

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Want to know more about location-enabled ADAS?

Get in touch