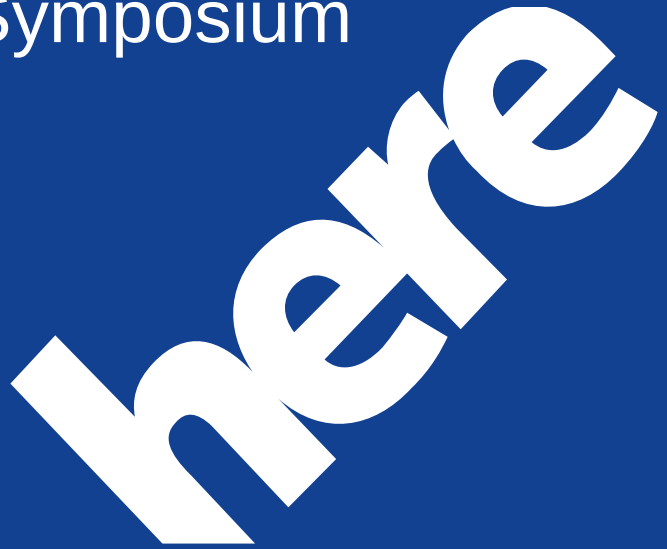
Next Generation Traveler

Data and Applications

Florida Transportation Data Symposium
2014



Keith Hangland
HERE State and Local Solutions
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Innovation to for continuous enhancement of travel

Industry Firsts

- Power in-car GPS EU (1994)
- Power online map portal (1995)
- Power in-car GPS NA (1996)
- Real-time traffic for in-car NA (2004)
- Map on a mobile phone (2004)
- Map-aided Adaptive Cruise (2006)
- Predictive Eco-Cruise (2010)
- Power Mercedes Automated Vehicle (2013)
- Next Gen ITS/CV (2014-2015)

Acquisitions

NAVTEQ
NOKIA
traffic.com
gate5
MAP24
earthmine
OI » bit-side
MetaCarta.
plum

New Brand

here

Traveler applications enable powerful solutions for transportation management

Navigation
enable comprehensive real-world maps built to galvanize travel, transport, safety and security of the system

GPS Devices
enable accurate, insightful real-time traffic services and data

Platform APIs
enable easy access and integration of maps, traffic, weather, parking, etc

Connected and Automated Vehicles
offer next wave of mobility and safety enhancement

HERE Maps | HERE Drive | HERE Transit

Florida's History with HERE Data

Unified Base Map

FDOT selects NAVTEQ/HERE for unified approach to managing roadway data

Regional Centerline Integration

FDOT LRS conflation with HERE Map

Collision Statistics

FDOT Processing of police reports for roadway safety

Emergency Response

Florida Dept of Law Enforcement adopts HERE for statewide dispatch system (IBM)

Traffic and Performanc e

FDOT moves to HERE real-time and archived traffic data for ITS, 511 and Incident and Performance Management

Next generation of transportation applications

Next Generation Drivers - Mobility, safety, and eco-efficiency applications for travelers

Driver Information

Vehicle Navigation
Curve Speed Warning
Speed Limit Advisor
Driver Alerts

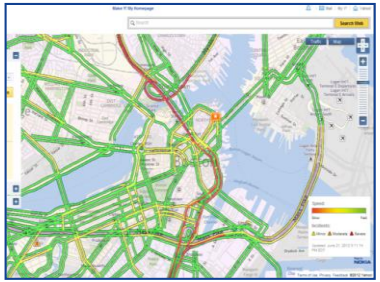
Active Safety

Adaptive Cruise Control
Adaptive Front lights
Collision Avoidance
Lane Keeping

Powertrain Efficiency

Eco Routing
Predictive Cruise Control
Powertrain Control
Transmission Control

Traffic Management



Traveler Information
Operations
Planning
Performance Measures

HERE Maps and Real-Time Data are combined in different ways to serve different transportation needs

Safety & Efficiency Example

Real-World Commercial Launch – Audi A8, A6

Navigation system closely networked with assistance systems

Adaptive Cruise Control

Recognizes exiting car at ramp and avoids braking

Prevents acceleration on exit ramp

Predictive Frontlights

Activates highway lighting on entrance ramp

Activates cornering lamps at intersections

Dynamic Shift Program

8-Speed Automatic Transmission avoids unnecessary shifts on narrow curving roads

Source: Audi Media-Services

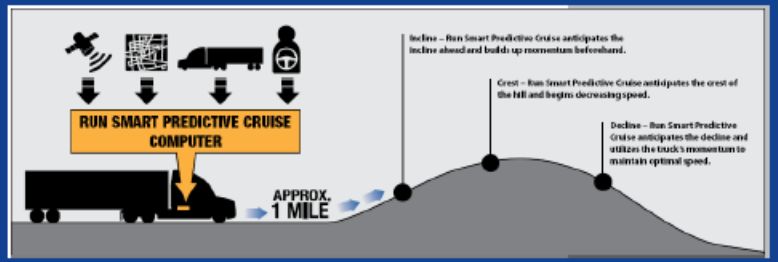
Optimizing Truck Routing & Efficiency

Predictive Cruise Control using HERE Slope Data

3% Fuel Savings with no travel time penalty

FREIGHTLINER

SCHNEIDER NATIONAL



GREEN BAY, Wis. – May 2, 2012 – Schneider National announced it will transform its fleet to reduce environmental impact. New trucks manufactured by **Freightliner** will include Predictive Cruise Control to save fuel and reduce CO2 emissions.

Source: Schneider National

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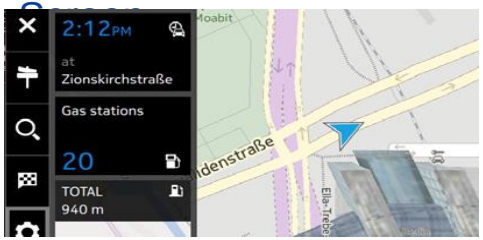
HERE Auto: Next Generation In-Vehicle Navigation

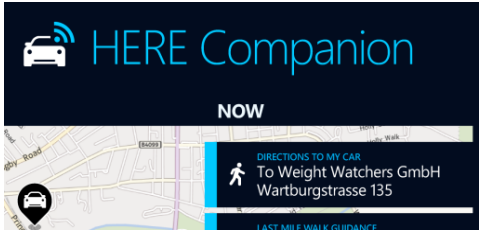
Learns driving habits, personalized screens, alerting, cross device sharing

Personalized Start



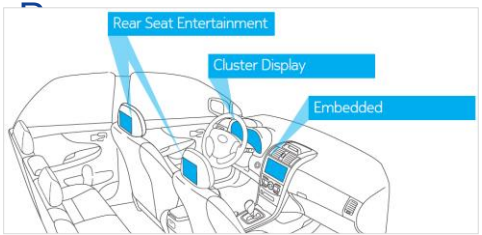
My Commute Mode

Companion Application



Rear Screen

From Driver To



Full Screen Virtual

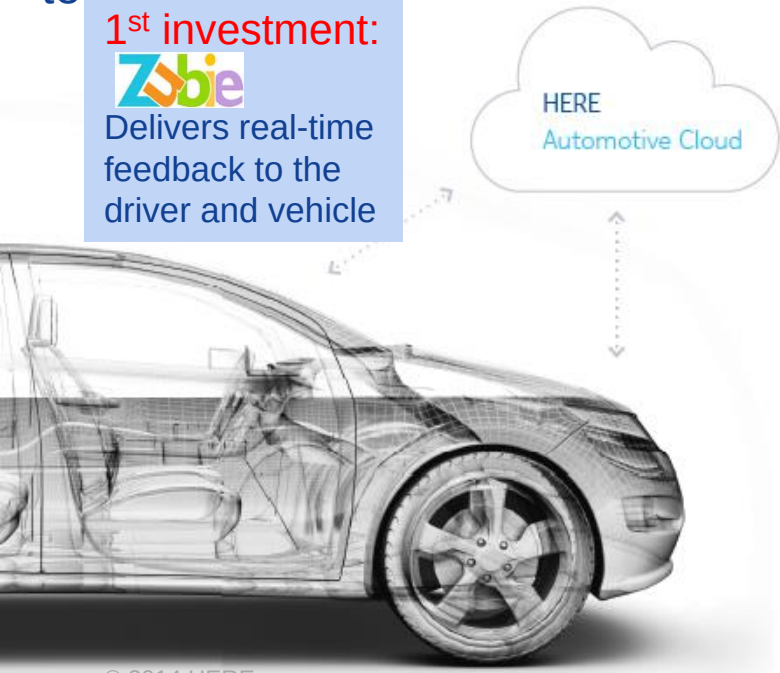
Next Generation Driving
Powering automated vehicle technology

Nokia announces $100M fund to accelerate connected car technology

1st investment:

Zubie

Delivers real-time feedback to the driver and vehicle



Nov 2013
HERE has teamed up with Mercedes Benz to jointly develop smart maps for connected cars and ultimately, self driving cars.

Jan 2014
North American Auto Show 2014: Continental and HERE team up to map out the future of vehicle connectivity using HERE maps and Electronic Horizon.

Oct 2014
HERE receives **BMW Supplier Innovation Award** in the area of Connected Driving.

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Enabling Data/Technologies

Enabling data for next generation travel

3D Maps
- terrestrial mapping using sophisticated 3D/LiDAR mapping technology, next generation of high accuracy true to life capabilities

Dynamic content - Predictive Traffic, Weather, etc
- better route planning and optimization enabled via years of archived traffic and weather statistics and real-time probe data

Vehicle Sensors/OBDII/CANBUS Data
- working with richer data directly from vehicles sensor equipment, supports a real-time view of driver behavior and roadway conditions

Platform/APIs
– seamless integration across devices (home/office/car), cross platform support for Android, iOS, Windows and In-dash systems

Connected Vehicles
- lightening fast wireless and DSRC communication between vehicles and infrastructure, enhances all kinds of safety and mobility apps

Highly Automated Vehicles and Driving
– enable hands free operation of vehicles, a new era of travel and commuting

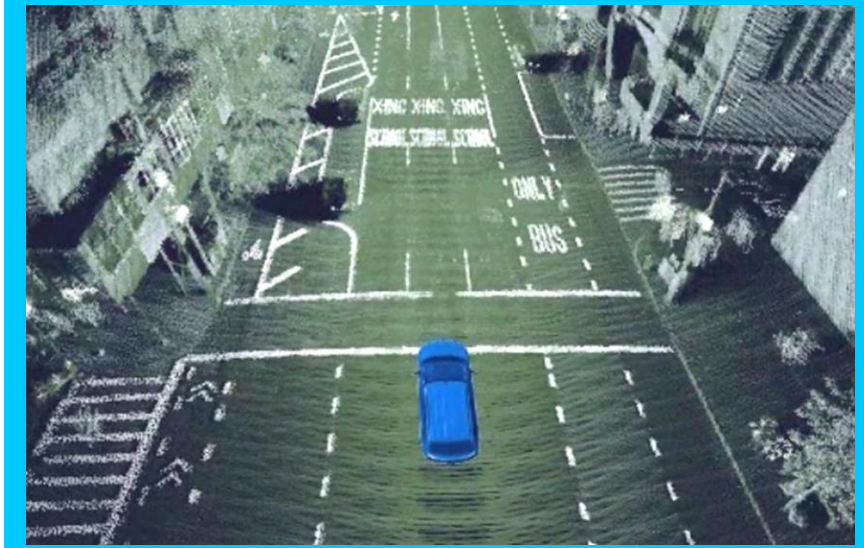
HD Map: Real-world reference data is the foundation

True vehicles with LiDAR and panocam

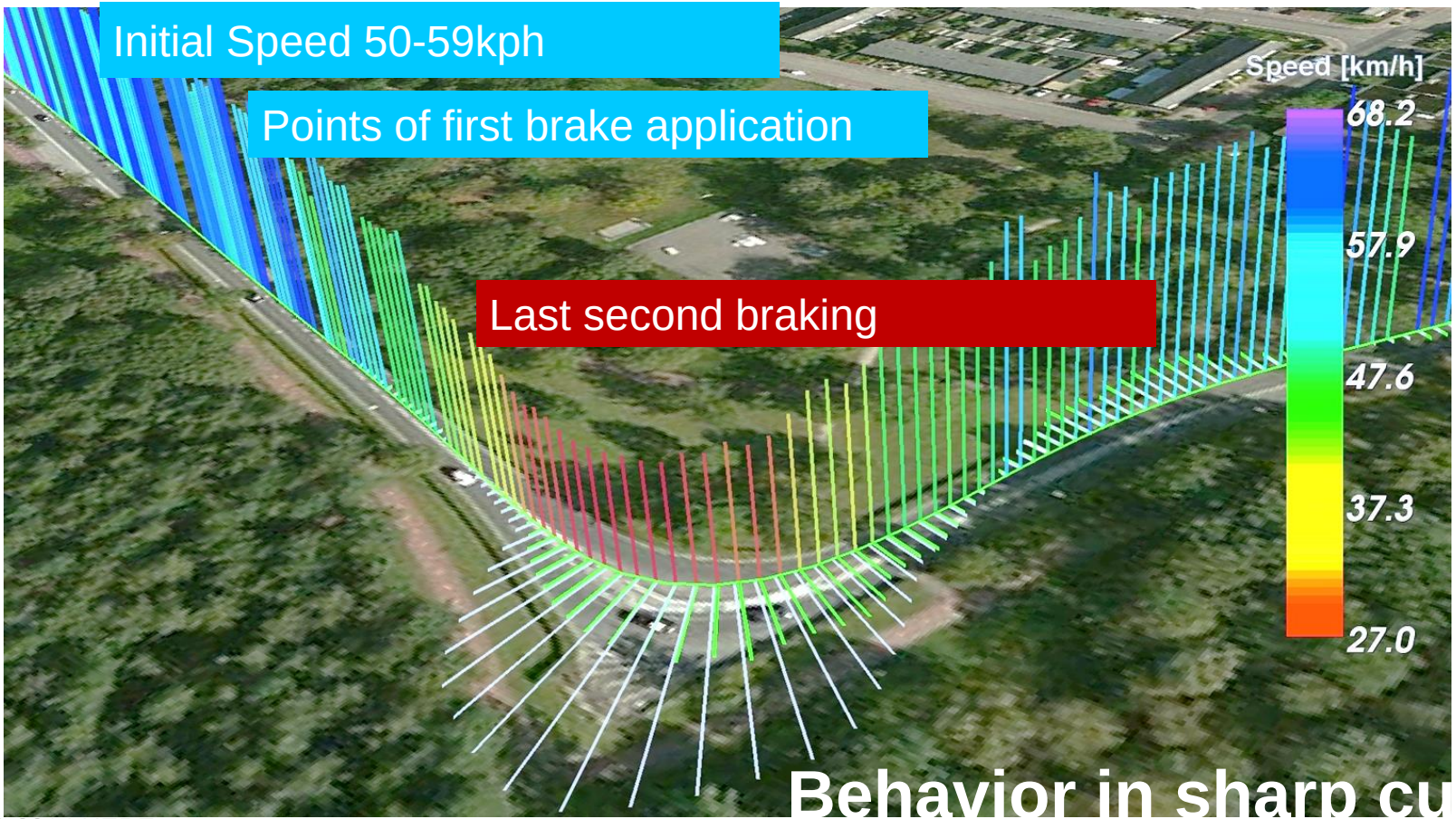
- HD Reality Capture

HD lane-level map with lane connectivity

- Hi-res 3D map Content



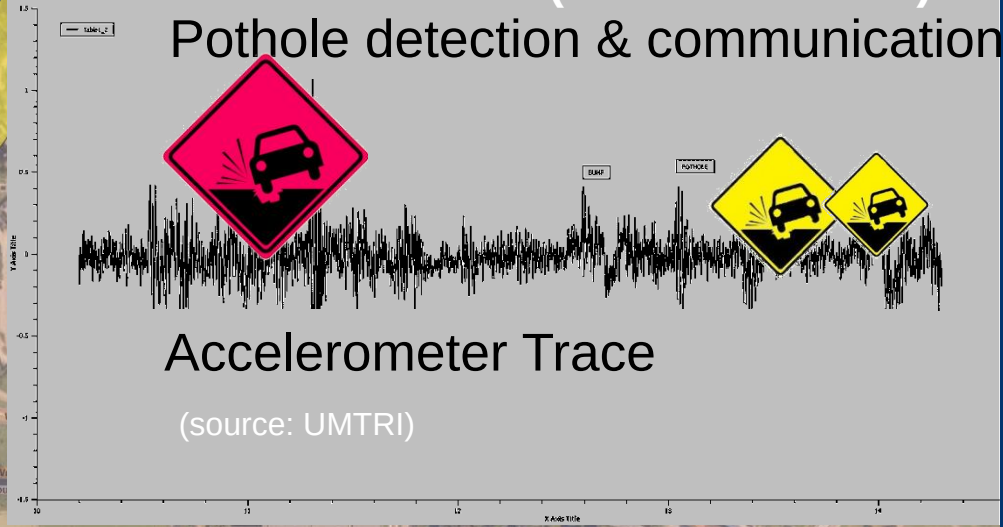
Data Analytics: Aggregated Braking Patterns



Meaningful Insights from Aggregated Data Analytics

- **Sudden slow spots (hard breaking)**
- **Incidents**
- **Weather**
- **Aggregated Diagnostics Information (CANBUS/OBDII)**

Pothole detection & communication



Accelerometer Trace

(source: UMTRI)

Summary of Potential Benefits

Technology	Infrastructure Management	Traveler Communication	Driver Safety	Performance/ Efficiency Mgmt
3D Maps and LiDAR				
Vehicle Sensors/OBDII Data				
Predictive Traffic				
Connected Cars				
Automated Driving				

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Transforming the way the world moves

Appendix

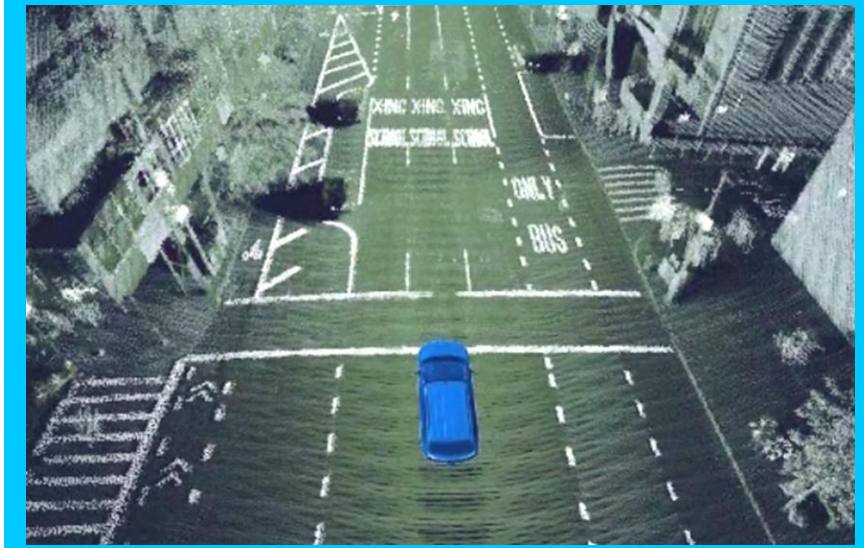
HD Map: Real-world reference data is the foundation

True vehicles with LiDAR and panocam

- HD Reality Capture

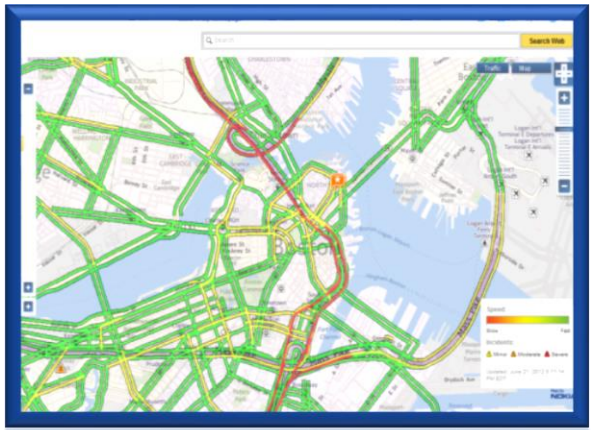
HD lane-level map with lane connectivity

- Hi-res 3D map Content

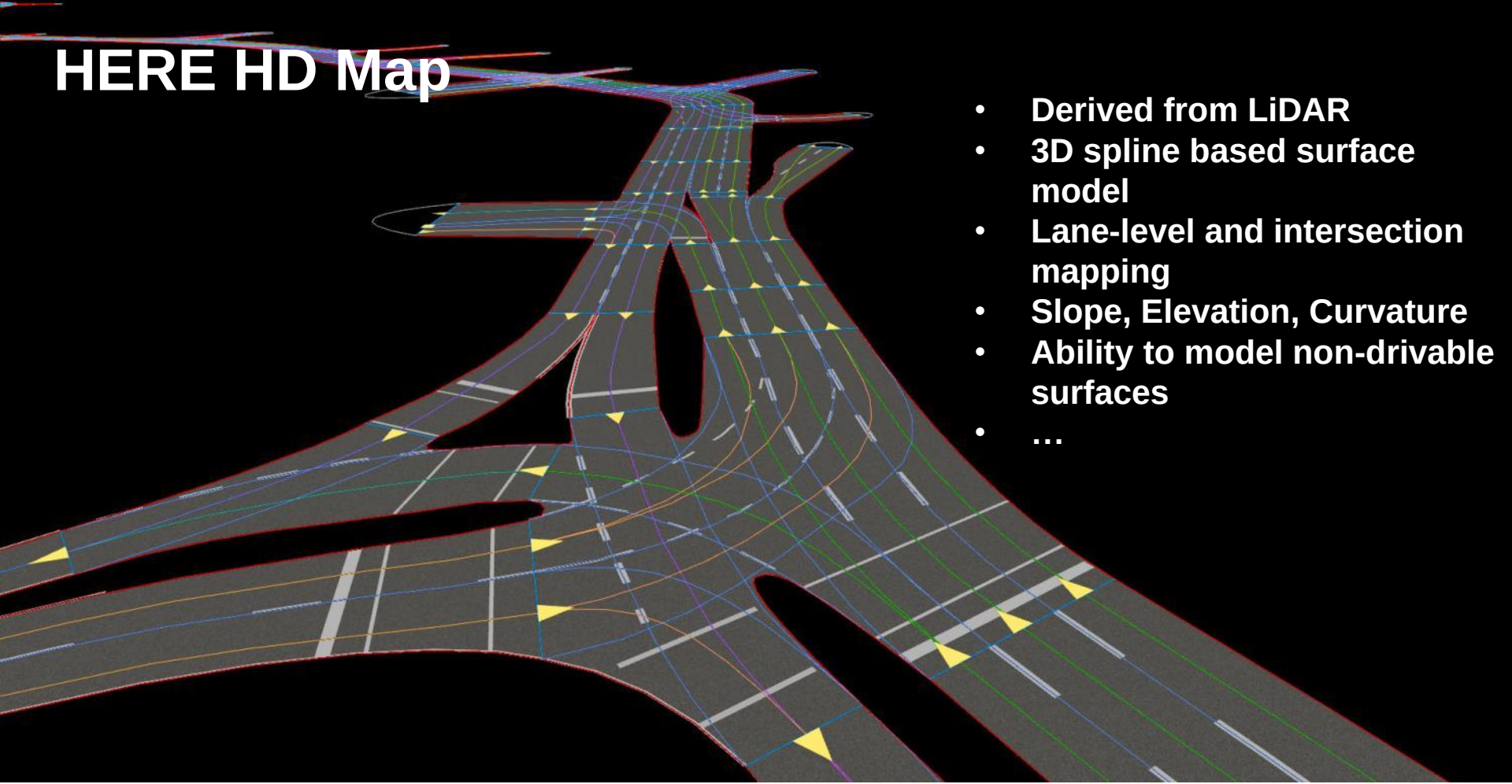


Data Collection, Fusion, Management

Process	Create	Empower
Billions of probe points monthly	**Broad and granular traffic conditions**	**Navigation, traveler information & analytics applications**

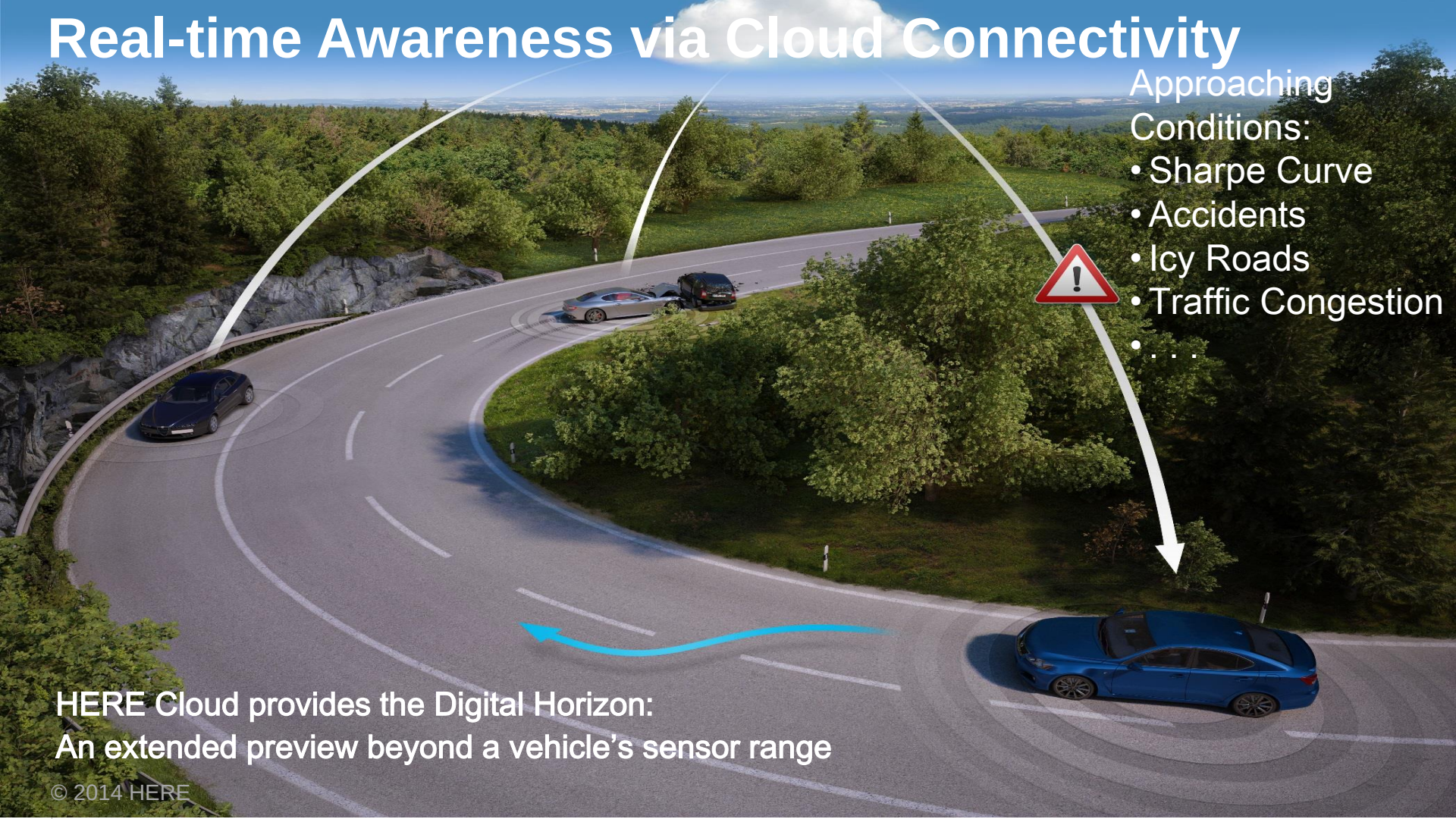


HERE HD Map



- Derived from LiDAR
- 3D spline based surface model
- Lane-level and intersection mapping
- Slope, Elevation, Curvature
- Ability to model non-drivable surfaces
- …

Real-time Awareness via Cloud Connectivity



HERE Cloud provides the Digital Horizon:
An extended preview beyond a vehicle's sensor range

HERE & Partner Applications & Devices

Multi-modal traveler applications for driving, public transit, pedestrian

HERE both creates applications and powers 3rd party applications for in-vehicle, PND, mobile devices and across operating platforms

HERE Maps | HERE Drive | HERE Transit

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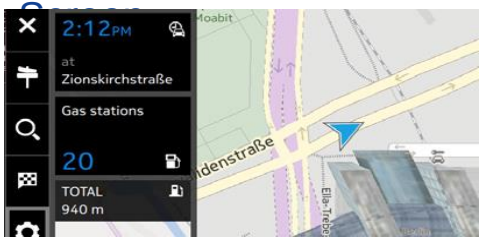

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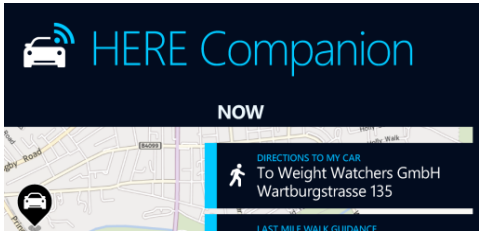

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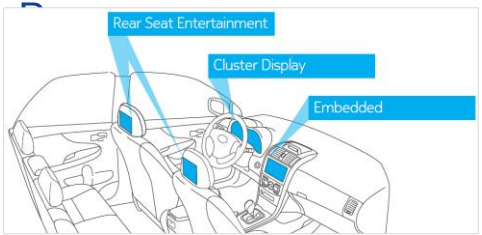
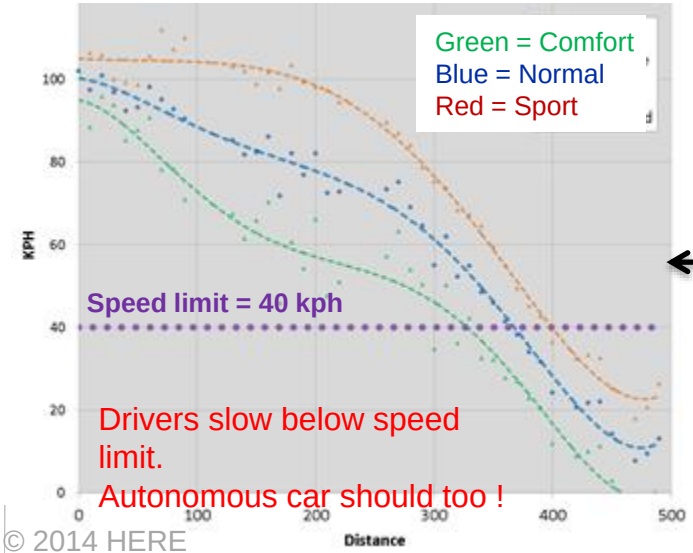


Full Screen Virtual

Data Analytics: Behavior-Based Speed Profile

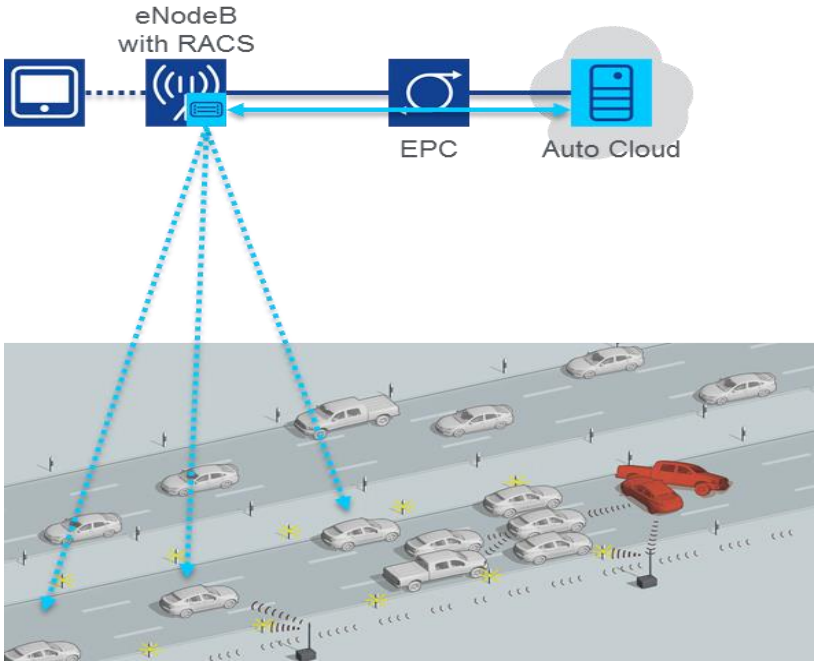
- Define driving behavior as
  - Normal (50 percentile)
  - Comfort (25 percentile)
  - Sport (75 percentile)
- User can tune autonomous driving style



Connectivity & Distribution
LTE: A Complement to DSRC

Nokia NET: Liquid Applications

- Edge Computing brings cloud-based data to the consumer with very low-latency
- Send DSRC Warning messages over LTE to provide longer rang notification
- Radio Access Content Server (RACS) easily added to existing LTE eNodeB sites.
- Existing broad LTE coverage available



HERE brings data management, analytics, connectivity, and applications to the Connected Vehicle