# AUTONOMOUS VEHICLES NEED RELIABLE DYNAMIC MAP DATA

Navigation and location-based services have become as core to the modern automobile as the engine or the chassis. **By Philippe Gicquel**

The acquisition of HERE, Nokia's maps and navigation arm, by a German consortium of automakers consisting of Audi AG, BMW AG, Daimler AG, and others has demonstrated how strategic it is for automakers to control maps and navigation. Automobiles are about mobility. Navigation and location-based services are as core to the modern automobile as the engine or the chassis. Moreover, maps and navigation become a must-have in an autonomous vehicle.

When sensors like radars or cameras stop "seeing", the infotainment system's map can still deliver useful information. For example, a camera may not "see" a speed limit sign hidden behind a truck while passing, but the infotainment system's map can provide that information to the driver regardless of visibility. In more standard scenarios, sensors may deliver reliable information up to 300 meters ahead, but map information can enable the driver to "see" much further ahead.

A feature often designated as

"electronic horizon" has first been proposed for comfort or fuel saving by adapting the gear box and engine behavior to the predictable road curves and slopes. Electronic horizon is now one of the foundational elements for safety and a must-have in an autonomous car.
The map information expected for these new features is much richer and diverse than what is used for simple GPS navigation. Both the spatial precision and the needed frequency for updates are still in debate, but they surely are different from what is available in today's cars. 300 meters are equivalent to 6 seconds if a car is moving at 180

km/hour. This is why a fast refresh rate of map information (ie, every one or two seconds) is essential to making a "real time" electronic horizon reliable beyond sensors' range.

To collect this "real time" data, map providers need to employ new methods of gathering information. Crowd sourcing using smartphone sensors to get high-definition traffic jam information has already been in production for years. To meet the need for this additional required data, cars themselves could be used. As they have a higher number of sophisticated sensors, and they are connected, cars can serve as a source for a continuous flow of information.

Several challenges must to be overcome to make this happen, many of which have nothing to do with technologies, but more to business organization and ecosystem. One automaker alone may not have enough cars on the road to gather the data with the expected level of reliability. For this reason, automakers need to team up and attack the problem together. To build an efficient carto-cloud-to-car loop, they should deliver sensor data in a standardized way to an independent party who could gather the information, treat it, and deliver back the expected services specified by each automaker.

The dream for an autonomous car has been pushed from outside the automotive industry. Silicon Valley companies put no limit in their ambitions because their way of thinking is different. They see opportunities where others would only see difficulties and they have put traditional automotive indus-

try under pressure. This healthy competition made Roger C. Lanctot of Strategy Snslytics to write few months ago that "Auto Industry [is] facing its Kodak moment". The acquisition of HERE shows that auto industry isn't passive. Here are some interesting questions for the coming months:

Will HERE, being now owned by several automakers, actively participate in the industry and try to work closer with GENIVI on the standards or will they drive on their own way? What type of company do you see winning the map battle and why? What challenges do you see for automakers to keep control of car data loop? We'd love to see your thoughts…

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*Since its beginning, GENIVI, as the automotive alliance for in-vehicle infotainment (IVI), established a location-based services (LBS) expert group that has defined several standard interfaces (APIs) to allow easy integration of navigation engines and applications. Standard interfaces defined by GENIVI that bridge in-car data to Web applications are now being discussed in a W3C working group with the possibility of becoming a World Wide Web standard. On the car-side, GENIVI has defined a common tooling with AUTOSAR to help define the standard interfaces between the Infotainment head-unit and other embedded Electronics Control Units (ECUs). For more information on GENIVI's location-based service APIs and other navigation work, please visit the ivi-navigation project; for more information on common project with AUTOSAR, please visit the IoNAS project.*