

# Global and China HD Map Industry Report, 2016

Sep. 2016

## **STUDY GOAL AND OBJECTIVES**

This report provides the industry executives with strategically significant competitor information, analysis, insight and projection on the competitive pattern and key companies in the industry, crucial to the development and implementation of effective business, marketing and R&D programs.

## **REPORT OBJECTIVES**

- ◆ To establish a comprehensive, factual, annually updated and cost-effective information base on market size, competition patterns, market segments, goals and strategies of the leading players in the market, reviews and forecasts.
- ◆ To assist potential market entrants in evaluating prospective acquisition and joint venture candidates.
- ◆ To complement the organizations' internal competitor information gathering efforts with strategic analysis, data interpretation and insight.
- ◆ To suggest for concerned investors in line with the current development of this industry as well as the development tendency.
- ◆ To help company to succeed in a competitive market, and

## **METHODOLOGY**

Both primary and secondary research methodologies were used in preparing this study. Initially, a comprehensive and exhaustive search of the literature on this industry was conducted. These sources included related books and journals, trade literature, marketing literature, other product/promotional literature, annual reports, security analyst reports, and other publications. Subsequently, telephone interviews or email correspondence was conducted with marketing executives etc. Other sources included related magazines, academics, and consulting companies.

## **INFORMATION SOURCES**

The primary information sources include Company Reports, and National Bureau of Statistics of China etc.

## Abstract

Global and China HD Map Industry Report, 2016 by ResearchInChina is mainly concerned with the following:

- ⇒ Acquisition modes and technical analysis of HD maps;
- ⇒ Market situation of global self-driving cars, covering structure and classification of autonomous driving, as well as domestic and foreign markets and policy environment;
- ⇒ Market situation of global HD maps, including status quo, layout, and development trends;
- ⇒ HD map industry chain, involving lidar, cameras, positioning systems, IMU, and algorithms, etc.;

Analysis of 7 major Chinese and foreign HD map providers, containing technical analysis as well as development and future trends of HD map business.

At present, there are mainly four types of enterprises that dominate the layout in the HD map field: internet firms, auto makers, sensor vendors, and digital map providers.

Overall, autonomous driving is now dominated by automakers, and they will not completely open their underlying data on vehicles to HD map providers. Thus, many auto makers (like Audi, Mercedes-Benz, and BMW), obtain HD map data sources by acquiring digital map providers. In contrast, due to a lack of experience in fault tolerance and underlying data of vehicles, Internet companies end up cooperating with automakers.

## I) Internet Firms

Internet tycoons like Google and UBER have, through acquisitions, obtained map data resources before producing HD maps based on their own algorithms and cloud computing capabilities. Google acquired a large number of digital map providers like Keyhole, Skybox, and Waze. In China, however, ground mapping is a highly confidential sector and therefore sets a higher entry threshold, which gives a big advantage to the Chinese digital map providers and turns away foreign players. Currently, there are 166 internet companies with mapping qualifications in China, and Internet giants like Baidu and Alibaba have through acquisitions occupied an important position in the Chinese map industry. Among them, Baidu purchased RITU and Alibaba bought AutoNavi.

Provider	Dynamics	Equipment
<b>Google</b>	Google draws HD maps for some cities, but it mainly provides the maps to its own self-driving cars	Velodyne 64-beam laser radar
<b>Baidu</b>	Baidu HD Map can automatically identify many targets including traffic signs, on-ground signs, lane markings, signal lamps, kerbs, bridges, lamp posts, and guardrail. At present, it has reached cooperative agreement with automakers such as BAIC, FAW, Volkswagen, and Chang'an.	Velodyne 64-beam laser radar

Source: ResearchInChina

## II) Auto Makers

Car makers make their presence in HD maps mainly through M&As and self-building. For example, Toyota adopted onboard camera data to build HD maps via crowdsourcing, while Mercedes-Benz, Audi, and BMW jointly acquired HERE, a map provider under Nokia. Automakers-led layout could help promote the data traffic between HD maps and autonomous driving. Moreover, auto makers can fully open CAN bus port internally, which would bring benefits to the testing of HD map-based autonomous driving scheme.

	Form	Acquisition Mode	Progress	Future Development
<b>Toyota</b>	Self-building	Using onboard depth cameras (such as the camera used in ACC) and based on GPS, the company obtains road data and transmit them to the cloud of Toyota, where the map is generated after the processing of its independently developed space information generation technology "cosmic"	At present, the system is mainly used to draw the maps of freeways, with the error controlled within 5 cm.	When it becomes mature, the system will be applied to all roads, based on which autonomous driving will be achieved by 2020.
<b>ABB+HERE</b>	M&A	Using Lidar, cameras, GPS and other sensors and positioning system to collect data	As of 2015, it completed the collection of the data on 1.2 million miles of HD road maps throughout 30 countries from 6 continents.	--
<b>Tesla</b>	Self-building (all data collected from its Model S)	Adopting Mobileye's REM technology and "Sparse 3D, Dense 1D" strategy to draw HD maps.	Globally, 40,000 car owners can provide 1 million miles of road data every day.	--

Source: ResearchInChina

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### III) Sensor Vendors

Using camera chips installed in cars, Mobileye is collecting data through crowdsourcing to make 3D maps. Its Road Experience Management software can identify specific road information like road markings. The bandwidth that it needs is only about 10KB per kilometer. Mobileye's entry into HD map is to provide turnkey autonomous driving solutions for its future development.

### IV) Digital Map Providers

Digital map providers, including foreign companies like Apple and TomTom and domestic ones such as Tencent, NavInfo, Xiaomi, and Careland, can complement each other's advantages at a minimum cost.

Digital Map Provider	Profile
<b>TOMTOM</b>	The HD map of Germany covers all expressways across the country, with a total length of 24,000 kilometers, including HD maps and real-time traffic. At the same time, it has released the beta HD maps of Detroit and Michigan. In H1 2016, the company completed the drawing of HD maps of California and Michigan.
<b>HERE</b>	HERE's HD maps, which have covered Silicon Valley and Michigan in the United States, and some parts of France and Germany, are expected to cover Japan in 2016.
<b>AutoNavi</b>	By the end of 2016, the company completed the collection of data on ADAS-class HD map of national/provincial highways and HAD-class HD map data on national freeways; by the end of 2017, ADAS-class data will be expanded to more than 30 urban main roads, while HAD-class data will cover provincial highways and the downtown areas of major cities.
<b>NavInfo</b>	In 2016, NavInfo completely covered expressways (L2-level); in 2017, it will complete HD maps of L2 and L3-level roads in 20 cities; in 2019, it will officially start to produce HD maps that fully meet the requirements of ADAS.
<b>Careland</b>	At present, it is collecting the map data in key pilot regions like Beijing, Shanghai, Guangzhou, and Shenzhen.

Source: ResearchInChina

### 1 Overview of HD Map

- 1.1 Definition
- 1.2 Composition
- 1.3 Features
- 1.4 Merits
- 1.5 Classification

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- 2.1 Acquisition Modes of General Map
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### 5.2 TomTom

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