

EUROPEAN TELEMATICS & ITS ADAS in Europe ~ a technical and market review

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SBD Ltd.

Overview

SBD Ltd. is an independent company providing specialist consultancy in the design and development of automotive components and systems. The company founded in 1995 has extensive knowledge of the strategic development of vehicle systems.

Working closely with manufacturers and suppliers, SBD provides consultancy at various levels including:

- Technical Research***
- Strategic Planning***
- Program Management***
- Product Development.***

SBD also provides the industry with detailed market and technical reports on various technologies, market trends and competitor analysis.

The company has helped to develop many successful systems seen in the market today and is continuing to help manufacturers implement the next generation of systems with an emphasis on *Vehicle Security* and *Vehicle Telematics*.

For more information, visit www.sbd.co.uk

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1. Executive summary

1.1 Introduction

当報告書は、欧州の自動車業界から提供されている先進運転支援システム（ADAS）の現状を詳しくまとめ、今後3～5年間に機能面がどの方向に発展していくかの分析を行う。更に、欧州でADASアプリケーションを普及させ、またその安全効果について顧客の認知度を高めるために自動車メーカーが克服しなくてはならない課題についても解析する。

This report provides an in-depth overview of the Advanced Driver Assistance Systems (ADAS) being offered by the European automotive industry, whilst analysing how the functionality trends are likely to evolve over the next three to five years. Additionally, analysis is provided of the challenges that vehicle manufacturers face to increase the fitment rate of ADAS applications in Europe and to educate the customer of their relative safety benefits.

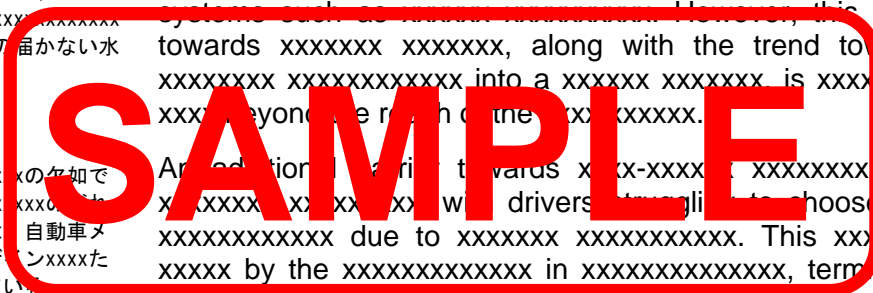
1.2 Summary of conclusions

欧州では、過去5年間に市場に投入されるADASシステムの数が急増し、今では13社の自動車メーカーが一つ以上のアプリケーションを提供するまでになっている。

Europe has witnessed a surge in the availability of ADAS systems over the last five years, with thirteen vehicle manufacturers now offering one or more applications.

また、xxxxxxxxxxxxxxxxx、xxxxxxxxxxxxxxxxx、xxxxxxxxxxxxxxxxx自動車メーカーが多い。しかし、xxxxxxxxxxxxxxxxx進んでいることや、xxxxxxxxxxxxxxxxx、xxxxxxxxxxxxxxxxx、xxxxxxxxxxxxxxxxx手の届かない水準にxxxxxxxxxx。

There is also a continued drive towards xxxxxxxx xxxxxxxxxxxxxx, and many vehicle manufacturers are xxxxxxxx xxxx with other xx-xxx xxxxxx systems such as xxxxxxxx xxxxxxxx. However, this continued push towards xxxxxxxx xxxxxxxx, along with the trend towards xxxxxxxx xxxxxxxx xxxxxxxxxxxxxx into a xxxxxxx xxxxxxxx is xxxxxxxx the xxx of xxxxxxx beyond the reach of the xxxxxxxx.



xxxxxxxxxxxxxxxxxもう一つの理由は、xxxxxxxxの欠如であり、xxxxxxxxのため運転者はxxxxxxxx、xxxxxxxxを選んでよいかわからない。これは、自動車メーカー毎にxxxxxxxx、用語、xxxデザインxxxxxxxxため、更に分かりにくい状況となっている。

Another additional driver towards xxx-xxxxx xxxxxxxx is the lack of xxxxxxxx xxxxxxxx will drivers struggle to choose between xxxxxxxx due to xxxxxxxx xxxxxxxx. This xxxxxxxx is xxxxxxxx by the xxxxxxxx in xxxxxxxx, terminology and xxx design between systems from different vehicle manufacturers.

このため、自動車メーカーが、必要なxxxxxxxxを創出しないまま、xxxxxxxxし続ける危険が増している。

There is an increasing danger, therefore, that vehicle manufacturers will continue to xxxxxxxx xxx xxxx xxxxxxxxxxxxxx without creating the necessary xxxxxxx xxxx.

短期的には、自動車メーカーは、主にxxx向けにxxやxxを充実させて、xxxxxxxxを推し進めていくと思われる。しかし、自動車業界全体としては、xxxxにxxxxをxxxxxxxxxxxxxxxxxxxxxxxx、その方法を模索し始めるべきであろう。

In the short-term, vehicle manufacturers are likely persevere in xxxxxxxx xxxxxxx xxxxxxx with added xxxxxxxxxxxxxx and xxxxxxxxxxxxxx, aimed mainly towards the xxxxxxx segment. However, the automotive industry as a whole must also begin to find ways to xxxxxxxx xxxxxxxx xxxxxxxx of xxxx with the xxxx xxxxxxx.

それには、自動車メーカーはまずxxxxxxxxに絞り、xxxxxxxx装置のxxは（あるとしても）極わずかに抑えたxxxxxxxxを開発し、より高度なxxを付加する前に、ADASのxxx、xx、xxxx xxxxxxxxとSBDでは考えている。

To do so, SBD believes that vehicle manufacturers should develop xxxxx-xxxx xxxxxxx initially focused on xxxxxxx xxxxxxx, with limited (if any) xxxxxxx xxxx xxxxxxxx or xxxxxxx systems, and to use these to xxxxx xx xxxxxxxx, xxxxxxxxxxxxxx and xxxxxxxxxxxxxx of xxxx before adding more advanced xxxxxxxxxxxxxx.

こうすることにより、自動車メーカーがADASのxxxxを創出する可能性が高まり、xxxxxxxxだけの、xxxxxxxxを少数作り出すのではなく、車道を守る全ての車のxxxxxxxxとなり、xxxxxxxx生じる。

In this way, vehicle manufacturers are more likely to create a xxxx xxxxxx for ADAS, so that the xxxxxxx xxxxxxx of all cars on the road xxxxxxxx xxxxxxxx for the xxxxxxx of xxxxxxx as a whole, rather than creating a small number of xxxxxx-xxxx xxxxxxx xxxxxxxx that are limited to xxxxxxxxxxxxxx xxxxxxxx.

1.3 Functionality trends

1.3.1. Current systems

欧州では過去5年にわたり、大きく次の二つの目的を達成するため、センサを用いて車の周囲を監視する先進運転支援システム (ADAS) が自動車メーカーによって提供されてきた。

不必要な、或いは反復性のある運転者の作業を減らすことにより、**快適性**を向上させる。

また/あるいは

危険につながる状況下で運転者を支援することにより、**安全性**を向上させる。

自動車メーカーがセンサ活用技術に自信を深めるにつれ、xxxxxxxxxxxxxxxxxxxxxxxx (xxxxxx やブレーキ) をしてxxxxxxxxする、xxxxxxxxxxxxxxxxxxxxxxxx ユーンが開発されてきている。図1では欧州の自動車メーカー各社から現在出されているシステムを一覧にまとめた。

Advanced Driver Assistance Systems (ADAS) have been offered by vehicle manufacturers in Europe for over five years, using sensors to monitor the surroundings of vehicles in order to achieve two high-level aims:

- *Reduce unnecessary or repetitive driver workload, thereby increasing **comfort**.*
- and/or
- *Aide the driver in potentially dangerous situations, thereby increasing **safety**.*

As vehicle manufacturers gain confidence in sensor-based technologies, xxxxx xxxxxxxxxxx xxxxx xxxxxxxxxxxxxxxxxxx are being developed that xxxxx xxx xxxxxxx by taking xxxxxxxxxxx xxxxxxxxxxx (xxxxxxxx or xxxxxxx), ensuring that xxxxxxx xxxxxxx xxxxx xxxxxxx. Figure 1 shows the systems currently offered by each vehicle manufacturer in Europe.

図1：自動車メーカー別、現在提供されているADASシステム

SAMPLE

Vehicle manufacturer	ADAS functionality offered					
	ACC	CWA	ISA	LDW/K	IV	BSM
Audi						
BMW						
Citroen						
Ford						
Honda						
Jaguar						
Lexus						
Mercedes Benz						
Nissan						
Peugeot						
Renault						
Volkswagen						
Volvo						

Source: SBD Ltd, 2006

当セクションでは自動車メーカーが次世代型ADASアプリケーションの機能性をどのように改良させているのかをまとめ、ADASに関する中期的、長期的な取り組みを分析する。

This section provides a summary of how vehicle manufacturers are enhancing the functionality of their next generation of ADAS applications, and an analysis of medium and long-term approaches to ADAS.

xxxxxxx一といった一次サプライヤーは、運転者に音声もしくはxxで危険を知らせることができるよう、xxxxx技術を用いた製品の改良を検討している。

xxは依然として、xxxxxxxなADASアプリケーションと位置づけられており、運転者にとってxxxxxxxxxxxxxxxx、自動車メーカーがxxxxxxxxxxxxxxxx。xxxxxxxxxxxされれば安全性能はxxxxx、SBDとしてはxxxxxxxxxxxxxxxxxxxxxxxxと考えていない。

Tier 1 suppliers such as xxxxxxx and xxxxx are considering enhancing their products with xxxxxx-xxxxxxxxx technology, in order to xxxxxxx or xxxxx xxxxx the driver of potential hazards.

XX remains a xxxx-xxxx xxxxx ADAS application, and vehicle manufacturers are xxxxxxx xx xxxxx xxx xxxxxxxxxxx as it provides xxxxxxx xxxxxx xxxxxxxx for the driver. Although the safety value may xxxxxxxx if xxxxxxxxxxx-xxxxxxxxxxxx technology is xxxxxxxxxxx, SBD does not believe that XX xxx xx xxxxxx xxxxxxx xxxxxxx xxx xxxxxx xxxxxxx.

死角監視 (BSM)

BSMシステムは、車両脇の部分カメラやレーダーで監視し、死角に入ってしまった車や、隣の車線を後方から接近中の車について運転者に警告するというのが一般的である。現在までに、xxxxxxxがBSMを採用しており、この他少なくともxxxこの技術を搭載した車種をまもなく投入してくると思われる。

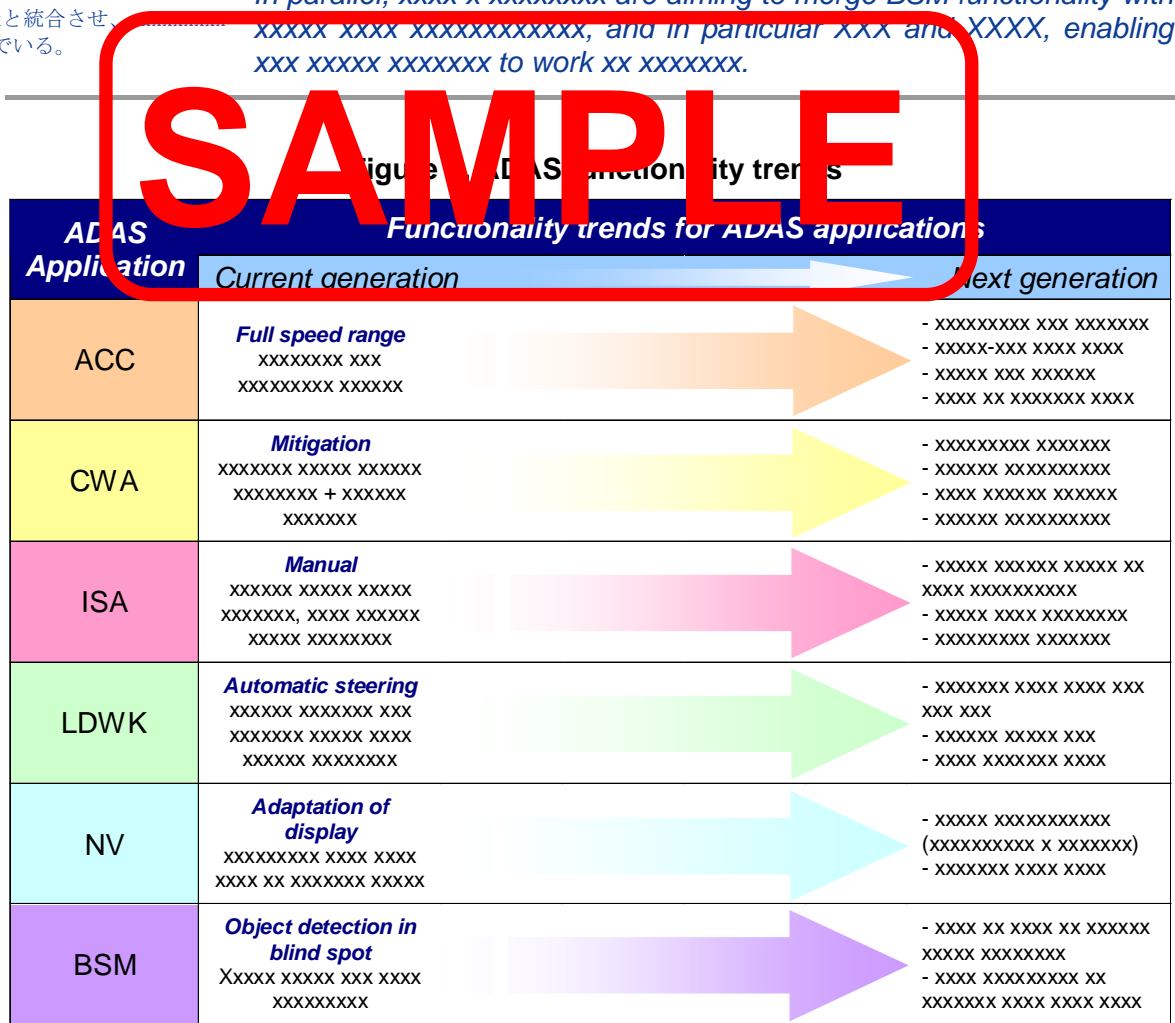
Blind Spot Monitoring (BSM)

BSM systems typically use cameras or radar to monitor the area adjacent to vehicles, warning drivers of vehicles located within their blind spot or approaching from behind on an adjacent lane. To date, Xxxx and Xxxxx have both implemented BSM, and at least xxx others are close to launching models with the technology.

これと並行して、xxxxxxxxxBSM機能を、xxxやxxxなどxxxxxxxxxxxxxxxxと統合させxxxxxxxxxxxxxxxx取り組んでいる。

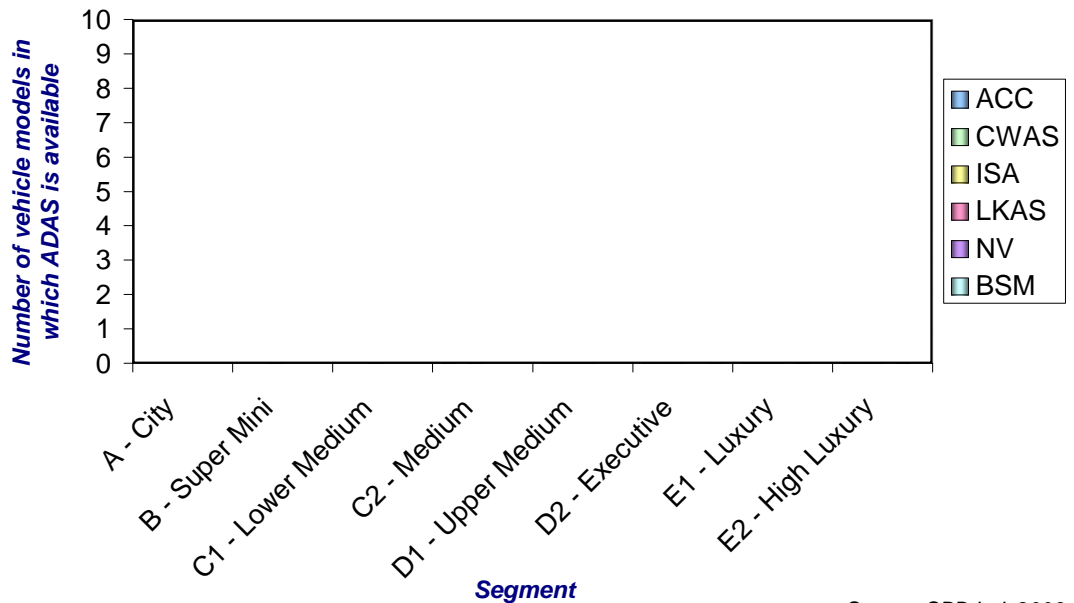
In parallel, xxxx x xxxxxxx are aiming to merge BSM functionality with xxxxx xxxxx xxxxxxxxxxxxxxx, and in particular xxx and XXXX, enabling xxx xxxxx xxxxxxx to work xx xxxxxxx.

図 2 : ADAS機能の傾向



Source: SBD Ltd, 2006

Figure 6. Availability of ADAS applications (EU) ~ by segment



Source: SBD Ltd, 2006



ADAS is no longer solely a xxxxxx-xxxxxxx xxxxxxxx, with a number of xxxxxx xxxxxx xxx xxxxxxxxxx xxx xxx xxx on xxxxxx xxxxxxxxxx xxxxxxx. xxx is the xxxxxx xxxxxx far xxxxxx on xxxxxx-xxxxxxx xxxxxx as can be xxx xxxxxxxxxx xxx xxxxxx without xxxxxx xxxxxx xxxxxxxx.

3.3 Bundling safety and comfort ADAS applications

Although vehicle manufacturers are increasingly offering ADAS on xxxxxx-xxxxxxx xxxxxxx, they have been unable to xxxxxxxxxxxxxx xxxxxx xxx xxxxxx in order to offer xxxxxxxxxx xxxxxxx xxxxxxxxxxxxxx for xxxxxx models. Costs of individual ADAS applications vary significantly, between €xxx for basic xxxxxxxx systems (e.g. the xxxxxxxx xxxx system) to €x,xxx for more complex systems that xxxxxxx xxxxxxxx xx xxxxxxxx (e.g. the xxxxxx xxx xxx xxx xxxxxxx).

Typically, the cost of xxxxxxxxxxxxxx xxxxxxx xxxxxxxx is xxxxxx in the xxxxxxx xxxx of the vehicle, as consumers have xxxxxxxxxxxxxx xxxxxx xxxxxxxxxxxxxx to xxx xxxxxx for xxxxxxx. In this way safety technologies, such as seat belts and airbags, have rapidly become xxxxxxxx-xxx.

The challenge for vehicle manufacturers is that xxxxxxx-xxxxx xxxx features remain xxx xxxxxxxxxx xx xxx xx xxxxxxxx. Consumers are likely to show xxxxxxxxxxxxxx xx xxxxxxxxxx xxxxxxxxxx xxxx features, and xxxxxxxxxx may arise from having to xxxxxxx xxxxxxxxxx xxxxxxxxxx applications that xxxxxxxxxx xxxxxxxxxx xxxxxxxxxx. The automotive industry must therefore investigate xxxxxxxxxxxxxx xxxx xx xxxxxxxxxx xxxxxxx-xxxxx xxxxx.

Audi



<i>ADAS applications offered by Audi</i>					
ACC	CWA	ISA	LDWK	NV	BSM
✓	✓				✓

4.2.1. Summary table

Figure 8. Overview of Audi's *current* ADAS applications

Audi						
ADAS application	Overview of system					
Active Cruise Control (ACC)	Supplier	Bosch		Diagram		
	Car models	Q7, A6				
	Cost	€1,620 (Package with CWA)				
	Functionality	High-speed	Stop&Go			
						✓
Technology	Radar	Lidar				
	77 GHz					
Collision Warning and/or Avoidance (CWA)	Supplier	Bosch		Diagram		
	Car models	Q7, A6				
	Cost	€1,620 (Package with ACC)				
	Functionality	Warning	Mitigation			Avoidance
			✓			
Technology	Radar	Lidar				
	77 GHz					
Blind-spot monitoring (BSM)	Supplier	Hella		Diagram		
	Car models	Q7				
	Cost	€1,620 (Package with ACC)				
	Technology	Radar	Camera			Infrared
77 GHz						

Source: SBD Ltd, 2006

4.2.2. Key features of Audi's ADAS strategy

❑ **Adaptive Cruise Control (ACC)**

The Q7 ACC system automatically alters the speed of the vehicle to ensure that a pre-determined distance is kept from the vehicle in front. The system enables drivers to select from four programs, depending on the driver's cruising preferences:



- **Distance 1 (Sporty)** ~ this programme maintains a shorter distance from the vehicle in front, and provides faster acceleration once the road ahead is clear.
- **Distance 2 & 3 (Standard)** ~ these programmes allow the vehicle to flow in line with the surrounding traffic.
- **Distance 4 (Comfortable)** ~ this programme is intended for use on country roads, where speeds are slower and distances between vehicles tend to be larger. This programme is also intended to be used for vehicles towing trailers.

Note. The A6 ACC system offers three programs – dynamic, standard and comfort – allowing the driver to pre-set the driving distances for each.

Unlike most other ACC systems available in Europe, Audi's system has **Stop & Go** functionality, enabling the vehicle to automatically slow down to a stop in heavy traffic. Once the traffic starts to move again, the driver can press a steering-wheel button to re-engage the ACC system.

❑ **Collision Warning and/or Avoidance (CWA)**

The ACC system only provides a maximum of 25% braking force when retaining a set distance from the vehicle in front. If, despite this level of braking, the distance between the vehicles continues to decrease rapidly, the CWA system takes over.

The CWA system provides two stages of warnings. Firstly, an alarm sounds and a red warning signal flashes on the instrument panel to warn the driver of a potential collision. If the driver still fails to react, the CWA system harshly applies the brakes for a short period, whilst energising the brakes to prepare for when the driver finally presses the pedal.

Audi's CWA system warns the driver of an impending collision through visual, audible and tactile alerts, and prepares the brakes to ensure maximum braking power. However, the system does not apply the brakes for a next deceleration time, and will therefore not avoid the collision without the intervention of the driver.

SAMPLE

❑ **Blind-Spot Monitoring (BSM)**

Audi's BSM system (named **Side Assist**) uses radar sensors to monitor traffic on both sides of the vehicle. Activated at speeds above 60 km/h (to encourage its use only on motorways and major roads), the system can detect approaching vehicles up to two car lengths behind.



Warning lamps are fitted in the two exterior mirrors, which illuminates depending on which side the approaching vehicle is on. If the driver fails to notice the initial visual warning and operates the side indicators, the warning lamps will flash several times with greater intensity.

The system can be switched on and off via a **Side Assist** button located on the driver's door. The driver can also adjust the brightness of the flashing lamps through the MMI central console.