

Connected cars: a look into the future

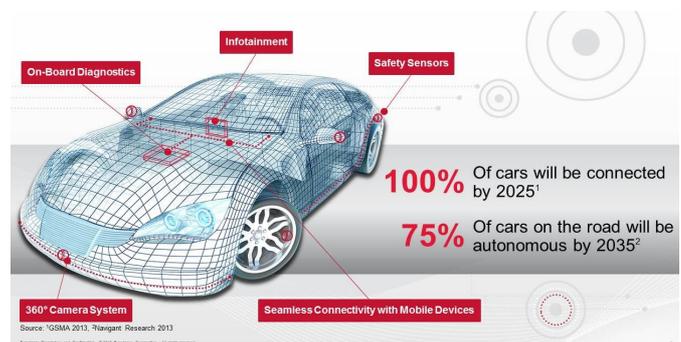
Introduction

The automotive industry is largely affected by three powerful forces - shifts in consumer demand, expanded regulatory requirements for safety and fuel economy, and the increased availability of data and information.

This white paper examines the impact of how big data, connected cars and programmatic location-based advertising and infotainment can be exploited for marketing, vehicle performance and safety within the automotive industry. We look at high level digital trends and examine innovations within these trends to develop a strategy for change based on recommendations for improvements within the automotive industry.

Trend: Connected cars and big data

Since the emergence of the Internet of Things (IoT) and use of big data, many industries have moved towards a trend of introducing connectivity in their products. The automotive industry is no different, with 14% of cars currently connected by a tethered device including 5% that have standalone connections¹. By 2025, 100% of new cars sold worldwide are forecast to have embedded connectivity², representing a rising trend that will shape the way consumers interact with their cars.



Connected cars have huge potential within the IoT, and will have the capabilities to use vast amounts of data to simplify and improve driving experiences. From interacting with other vehicles and road infrastructure in order to reduce collisions and increase customer safety, to interacting with a customer's other connected devices to create a more automated lifestyle, there are many applications of connectivity and data in the driving space³. Given that an average commuter spends over 14% of their waking hours inside a car⁴ products and services that tap into the automotive IoT trend will be a key focus for companies in the automotive industry. The resulting big data will in turn revolutionise the way cars are designed and present automobile companies and OEMs (original equipment manufacturers) with tremendous scope for innovation.

Recent Innovations

Anti-collision and safety: At the 2015 Consumer Electronics Show, BMW presented their i3 model to demonstrate 360-degree collision avoidance and fully automated parking⁵. The ability of cars to interact with the surroundings and self-adjust has improved car safety and created innovations in anti-collision that has the potential to save scores of lives on the road.

¹ <http://www.analysismason.com/Research/Content/Reports/connected-cars-forecast-Jun2014-RDME0/>

² <http://www.gsma.com/connectedliving/wp-content/uploads/2012/03/gsma2025everycarconnected.pdf>

³ www.wired.com/insights/2014/09/connected-cars

⁴ www.symphonyteleca.com

⁵ www.engadget.com/2015/01/07/bmw-i3-learned-how-to-park-forgot-how-to-crash

Self-driving/Autonomous cars: With over 90% of traffic collisions attributed at least in part to human error⁶ autonomous vehicles represent an opportunity to dramatically decrease dangers on the road. All the major automobile companies are currently working on self-driving cars but these are still a long way away from being mainstream. The Google self-driving car⁷ takes driver safety to a new level. It eliminates the driver completely. Tesla⁸ is on its way to introduce the autopilot feature on its cars making self-driving cars a commercial reality.

Collective wisdom of cars and drivers: Over the past decade, drivers have become increasingly dependent on GPS devices and map apps on phones for directions. The initial intent of these innovations was to help drivers reach their destinations, but the real-time collection of location data from drivers has allowed companies such as Google to put together features such as alerts on real-time traffic, roadblocks and accidents as well as traffic forecast. Other app innovations such as Waze use the collective information from drivers to help them remain informed about incidents, accidents and fuel prices.

Increased awareness on fault finding and safety: According to Deloitte⁹ *'with increasingly better possibilities of data analysis, predictive analytics is developing into a powerful tool allowing for an enormous boost in forecasting efficiency as well as operations and performance'*. Although there is a massive challenge to make sense of the vast amounts of data available, improvements in analytics software *'allows this information to be merged regardless if the information is "machine-readable" datasets or unstructured data such as videos, sound recordings, or texts. Done right — the results are impressive.'* This shows that car manufacturers are already making inroads in the use of big data produced by cars and suggests that investments within this area can help us move towards using driver and vehicle information (via the Internet, social, and increasingly interconnected cars) to improve efficiency and performance. Manufacturers are also looking to implement integrated testing and recall management facilities as a result of data and performance analyses to be more proactive in detecting defects. This process is illustrated in Fig. 1 below:

Figure 1: Four-part quality, safety, and recall management framework



This demonstrates that there is a current focus to move towards building intelligence and fault reporting functionality into connected cars that needs to be developed further with better data.

Infotainment and in-car advertising: At CES 2015 several infotainment developments were exhibited by car manufacturers; Audi announced that their Q7 model will support both Android's *AutoPlay* and Apple's *CarPlay* software¹⁰ and Mercedes-Benz introduced their F 015 concept car¹¹ packed full of connected technology.

In-car advertising is already providing Uber and Lyft drivers with the opportunity to generate revenue from in-car advertising/infotainment systems. They state that *'The system pulls in information from a passenger's pick-up and drop-off points via the driver's GPS, which Viewswagen says gives a signal of buying intent'*.¹² This shows that there is a definite shift towards using infotainment systems and consumers are open to this idea.



⁶ <http://cyberlaw.stanford.edu/blog/2013/12/human-error-cause-vehicle-crashes>

⁷ <https://www.google.com/selfdrivingcar/>

⁸ <http://www.wired.com/2015/10/tesla-self-driving-over-air-update-live/>

⁹ www2.deloitte.com/content/dam/Deloitte/us/Documents/manufacturing/us-auto-automotive-news-supplement.pdf

¹⁰ www.engadget.com/2015/01/08/audis-latest-supports-android-auto-and-carplay

¹¹ www.engadget.com/2015/01/07/mercedes-benz-f-015-autonomous-concept-interview-photos

¹² <http://uk.businessinsider.com/viewswagen-in-car-ad-platform-to-launch-for-uber-and-lyft-drivers-2015-4?r=US&IR=T>

Gaps In The Market

A number of car manufacturers such as BMW, VW and Lexus offer park assist options, allowing drivers to let the car take over and park itself using cameras and sensors. However, this technology has applications which are not being used to tackle driving issues such as poor assessment of hazards due to inexperience and overconfidence of ability, cited as one of the key risk factors for younger drivers.¹³

As seen in the recent *ConnectedDrive* innovation by BMW, data can be used to provide drivers with information about the status of traffic on their routes. Currently this data is mostly used for traffic re-routing, showing an underutilisation of the available data to improve a customer’s driving experience. Using data about other cars on the road represents a huge gap in the market for providing further driver safety initiatives.

Recommendations	Risks & Challenges
<p>Help your customer improve their driving Use cameras, sensors, and driver analysis data to introduce a teaching tool to help drivers improve their skill, intelligently sensing when the driver may benefit from receiving ‘on the go’ tailored lessons. Benefit: Increase driver ability.</p>	<p>- Risk of lawsuits and litigations related to any accidents caused while using sensors and driver analysis tools</p>
<p>Help your customer become safer on the road Use data about other vehicles on the road to implement a system to provide on the go alerts, warning drivers of oncoming emergency vehicles and reckless drivers. Benefit: Provide a safer driving experience for all.</p>	<p>- Rigorous testing needed to ensure new systems are safe against connectivity and cloud computing failure</p>
<p>Help your customer benefit from their improved ability Introduce a driver score system for customers using a data driven approach to improving their skill. Use this score to partner with major insurance providers to pass savings on premiums to drivers with higher scores. Benefit: Pass benefits on to customers, increasing customer brand affinity</p>	<p>- Challenging to persuade customers to opt-in due to customer apprehension of opt-in services and data ownership</p>
<p>Partner with innovative infotainment and in-car advertising software providers incentivise participation Utilise partnerships with innovative app and software developers to introduce infotainment software that provides real benefits to customers Benefit: Build brand advocates by rewarding customers signing up to the ‘cutting edge’ of infotainment, leading to greater opt-in adoption</p>	<p>- Extensive understanding of customers needs and behaviours while using connected cars required to understand the correct partnerships. Currently very little data or insight on this due to recency of the technology</p>
<p>Work towards entirely autonomous vehicles Strive to eventually provide a vehicle that offers complete autonomous driving, allowing customers to benefit from complete safety and peace of mind. Benefit: Significant cost savings in insurance, healthcare, reduced journey times, reduced fuel usage and public transport.</p>	<p>- System must not be at risk of malicious technology attacks, allowing connected cars to be hacked and controlled by the hacker than the driver as per the lawsuit brought against Toyota, Ford and GM in 2015¹⁴ - Challenging to overcome customer apprehension towards the dangers and risk to personal safety during malfunctions</p>

¹³ <http://www.brake.org.uk/safedrivingreports/15-facts-a-resources/facts/488-young-drivers-the-hard-facts>

¹⁴ <http://www.abbottlawgroup.com/connected-car/>

Strategy for Change

Based on recommendations, we suggest implementing the following strategies for change within the automotive industry:

1. **Standardisation of automotive data** within the industry. An agreed data communications model must be established across the industry e.g. http for web communication.
2. Make agreed **data management standards available to open source software developers** within the industry.
3. Use data provided by connected cars to **change consumer perception** of autonomous vehicles in terms of road safety and user privacy.
4. Ensure **infotainment systems primarily as safety first systems** and make sure they are not seen as distracting devices.
5. Infotainment systems should provide **car to car data and real-time feedback, warnings and guidance to increase road safety and vehicle performance** based on real-time and historic data.
6. Automotive data supplied by connected cars should be used to **influence new designs for autonomous cars** to decrease road congestion. The aim should be customised driving pods dependant on passenger numbers.
7. Introduce **reduced cost vehicles for early trialists of latest developments** in connected cars using standardised data and **develop revenue sharing models** to reward consumers that help gather big data under agreed standards.
8. To develop in car advertising and infotainment **relationships needs to be built with key players** such as Google or Bing ads and entertainment channels to create a targeted programmatic approach.



Conclusion

Recent innovations show that many companies within the automotive industry are competing to offer the next disruptive innovation. However, there are challenges to persuade consumers to adopt new technologies especially where they may 'lose control' as with autonomous driving. Our recommendations highlight the need for car manufacturers and developers of connected software to bridge the gap between what is currently available and creating a totally autonomous vehicle. When doing this there still needs to be a key focus on the challenge of changing current consumer perception. We recommend using connected cars to increase safety on the road as this will persuade the consumer to see connected cars as beneficial on more than a superficial/luxury level. Consumer trust and questions of privacy need to be addressed especially if infotainment systems are to be successfully used for programmatic advertising. In time we believe these recommendations will encourage consumers to view having a connected car as essential, driving the adoption of connected cars and technology even faster than presently predicted. We call on leaders and influencers within the automotive industry to act on our recommendations to bring the best fit intelligent, road safe and lifestyle suggestive connected car to the consumer sooner rather than later.