DRIVING MOBILITY THROUGH AUTONOMY IN INDIA

Is India ready for driverless cars?

Ipsos Business Consulting

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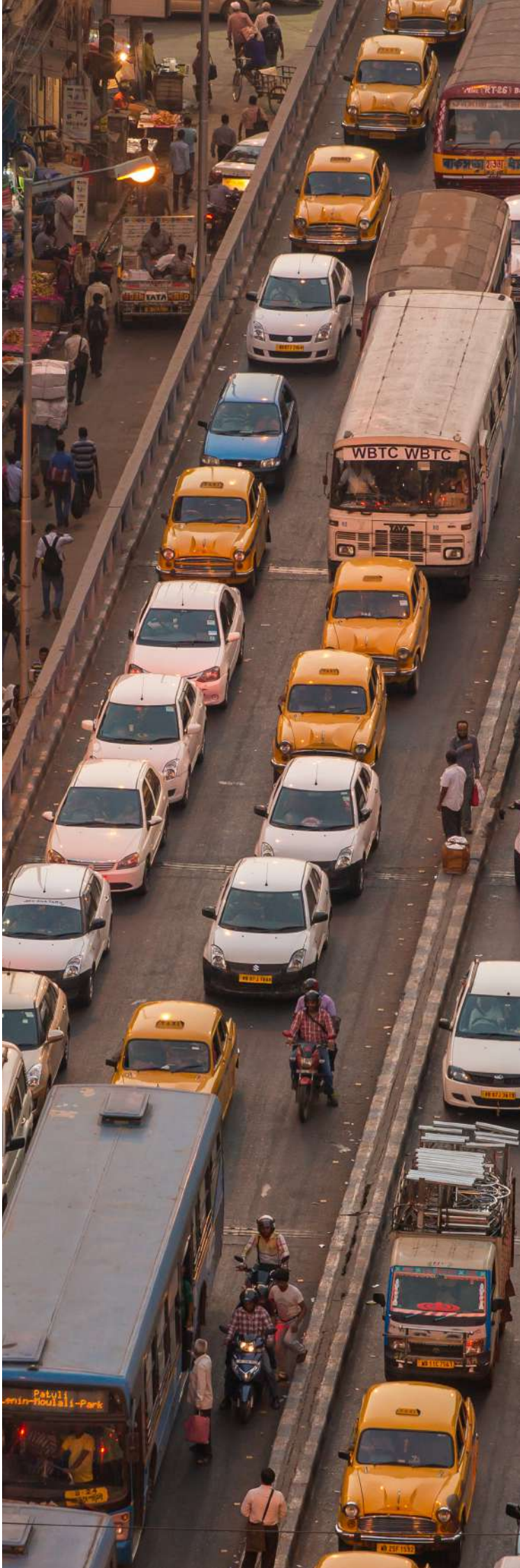

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INTRODUCTION

Autonomous vehicles, which can be partially or fully controlled without human interaction, will soon start disrupting the global auto industry. All major automakers are shifting their focus from developing traditional powertrains to building expertise on artificial intelligence, software development and related fields, such as visual recognition, navigation and integration capabilities. Not only has the thirst for future-focused technology led to a groundswell of start-ups, we are now seeing increased collaboration between traditional carmakers who until recently tended to view each other suspiciously as competitors rather than potential partners who must work together to face down existential threats to the entire sector.

This shift towards self-driving vehicles is not taking place at an equal pace around the world. India's auto sector is at a very early stage in its journey toward developing and manufacturing autonomous vehicles. Rolling out autonomous vehicles will be a complex task in India due to number of significant challenges.

Poor data, traffic conditions and infrastructure challenge India's development of autonomous vehicles

Reliable traffic data is scant In India where weak infrastructure presents another major obstacle to the development of autonomous vehicles. These issues are amplified by India's notoriously bad traffic, which poses serious technical challenges when it comes to developing algorithms for operating autonomous cars. Developing adaptive machine learning algorithms based on existing driving habits and road conditions is a complex solution to this key challenge.

Indian consumers are highly price sensitive, so achieving autonomous vehicles prices that are acceptable to buyers and commercially viable for automakers is perhaps the most challenging balancing act for the sector.

Local carmakers will also struggle to reduce their speed to market when compared with foreign companies that benefit from long-standing global production platforms.

Carmakers must address Indian consumer concerns about autonomous vehicles

Much of the success of autonomous vehicles in India will depend on whether automakers can earn the trust of consumers, especially regarding safety and data privacy issues.

Ipsos Business Consulting survey data reveals demographic factors also affect attitudes toward technology adoption. While less than half of all Indians trust autonomous vehicles, acceptance levels among millennials are much higher, at about 70 per cent. However, 62 per cent of people cited data privacy and system failure, including responsiveness to driving conditions and risk of equipment failure, as major reservations with autonomous vehicles.

Improved fuel economy, lower accident rates and cheaper insurance were seen as key benefits.

Some experts say autonomous vehicles will be 20-times safer than manually driven cars. While people in India desire safer roads — the country has one of the highest road fatality rates in the world at about 175,000 deaths per year — and they welcome the idea that autonomous vehicles can help achieve this, they will take some convincing before they are willing to hand over control of their cars to a computer.

Fully autonomous vehicles need better roads and infrastructure and more stringent traffic regulation

India's roads could currently support semi-autonomous vehicles, but more advanced vehicles would not be viable without significant improvements in infrastructure and regulation. Automakers have always planned for human-operated cars to co-exist with autonomous vehicles. However, Indian manufacturers think it will take at least decade of development before the two types of vehicles could operate safely alongside each other.

In US and Europe, infrastructure and technology have advanced hand-in-hand. For example, California's roads are generally well marked and maintained which enables technologies such as LIDAR (light detection and ranging) — a computer-vision technology for seeing the road and objects, including other vehicles, road boundaries, lanes, barriers and trees — to function and safely control a cars direction and speed. In India, poor infrastructure currently renders such technology unviable.

The success of Indian manufacturers will be determined by how well they prioritise investment across developing powertrains, autonomous features and safety technologies. The government needs to support the development of autonomous vehicles by expediting infrastructure development and more rigidly enforcing driving regulations.

The critical success factor for Indian car makers would be to reduce their time to market by increasing partnerships and acquisitions in artificial intelligence, safety technologies, software integration, development of critical digital and physical infrastructure, and quality control.

As the technology develops there will be increased disruptions across the spectrum of related industries, including component manufacturers, software developers, system integrators, dealerships, and auto finance and insurance firms.

Many experts believe that while it's hard to provide a concrete timeline, fully autonomous cars are at least 10 years away from becoming a reality in India.

Electronic vehicles are gaining popularity in India

Homegrown brands, such as Tata Motors, Maruti Suzuki and Mahindra & Mahindra, are spearheading local development of electric powertrains.The government will also shake up the auto industry with the enactment of its “New Electric Vehicle Policy”, The policy, which affects passenger and commercial vehicles, aims to limit the sale of petrol and diesel vehicles, reduce interest rates on vehicle loans and taxes for electric vehicles and lower import duties for batteries.

The government's National Electric Mobility Mission Plan aims to achieve annual sales of electric and hybrid cars of 6 million to 7 million by 2020. The central government was reportedly holding discussions with 50 domestic and global companies to raise large-scale investment for purchasing and deploying electric vehicles, three-wheel vehicles, batteries and charging stations across the country.

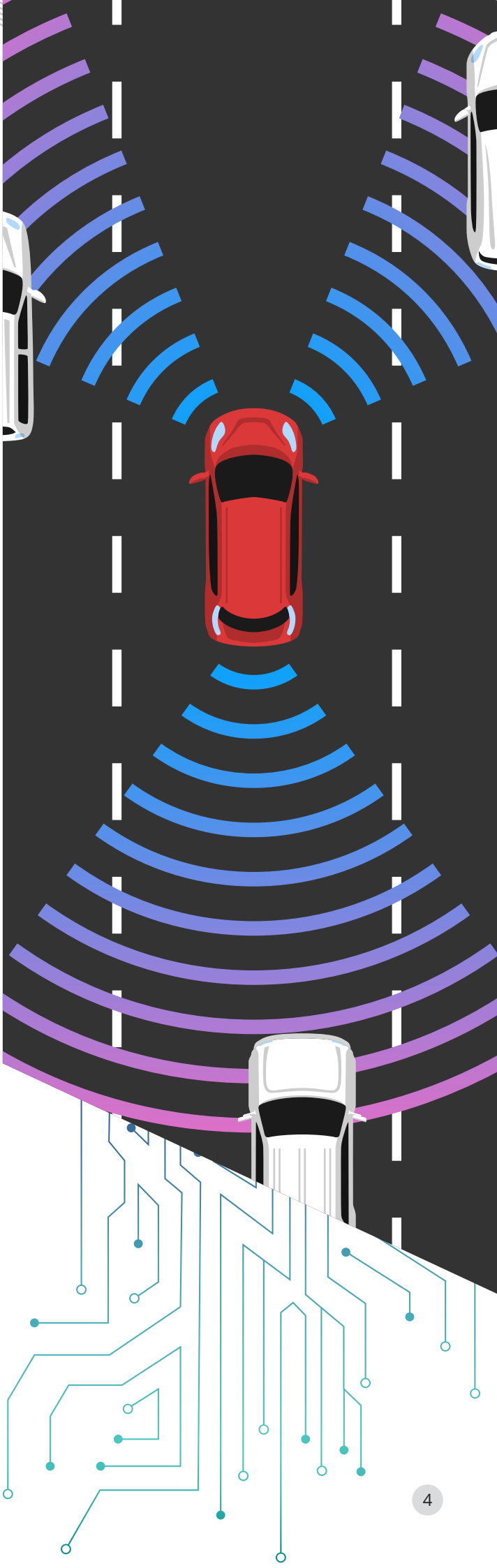
Indian manufacturers can add semi-autonomous features into electric vehicles such as adaptive cruise control, lane assistance and automatic braking technology.

Several state governments and corporations have recently ventured into the electric vehicles space to support the drive by central government.

Rising demand for ride-hailing services, especially in major cities and urban centres, has seen carmakers collaborate with businesses such as Ola and Uber. Mahindra and Mahindra recently entered into a partnership with Uber India to deploy electric vehicles in Delhi and Hyderabad within early 2018, before expanding to other cities. The tie-up follows a similar deal between Tata Group and Jayem Automotives to deploy a fleet of electric Nanos, rebranded as Jayem Neo, in Delhi through Ola.

The fleet and shared mobility services will be early adopters of electric vehicles as their economies of scale make the cars commercially viable. However, consumers are unlikely to purchase electric vehicles until the entire ecosystem and support network is in place.

The public and private sector need to substantially reduce the total cost of ownership and improve supporting infrastructure for electric vehicles, such as a national network of charging stations and a smart electricity grid to handle the additional load. Given the related challenges in achieving this, getting to 100 per cent electric vehicles in the next decade is unlikely.



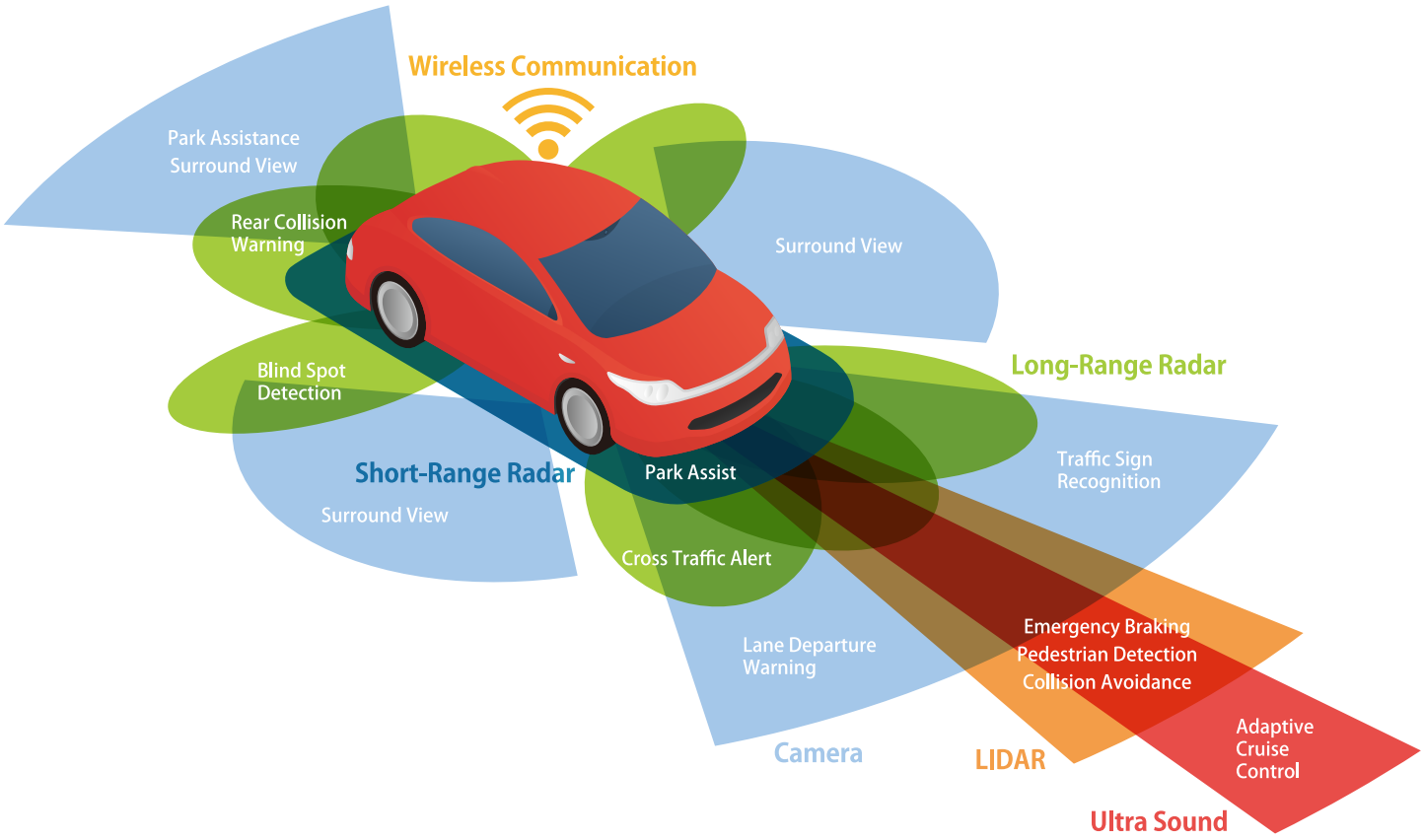
THE RACE TO THE CHEQUERED FLAG

GLOBAL CONTEXT

More than a dozen multinationals are actively involved in developing autonomous vehicles. Companies such as Tesla, BMW and Toyota have become well known for pioneering electric and autonomous cars. Since 2016 there has been a groundswell in start-ups, software and hardware developers, technology firms, automakers and private companies investing in the broadening field of businesses involved in the development and testing of autonomous vehicles. Global automakers are focusing on acquisitions and partnerships to gain a competitive advantage.

Carmakers have been developing specific capabilities in the following areas:

- Assisted driving/autonomous software
- Driver safety tools
- Connected vehicle/driving data
- Fleet telematics
- Vehicle-to-vehicle communications
- Auto cyber security



Notable autonomous vehicle deals and partnerships

General Motors' acquisition of Cruise Automation	Cruise Automation makes automated driving technology. It built the first highway autopilot system that can be installed in a vehicle. It uses sensors and machine vision technology to keep vehicles within lanes and maintain a safe distance from other vehicles.
Audi's partnership with NVIDIA	NVIDIA, a developer of graphics cards for computers, is increasingly focusing on the automotive market. It has partnered ZF & Bosch to build its supplier relationship with Audi, who it is now partnering with to produce a "Level 4" autonomous car
Renault-Nissan's partnership with Microsoft	Renault-Nissan vehicles will use Microsoft's cloud technology to access vehicle software and data to predict maintenance, use driver data for research, operate Microsoft's productivity services (including Office 365 and Cortana virtual assistant) and provide real-time contextual navigation. Data produced and collected through the platform will also be used for machine learning in autonomous driving systems.
Daimler's acquisition of RideScout	Daimler, which owns the Mercedes-Benz and Smart brands, acquired RideScout, a US ride-sharing app, and Intelligent Apps, a German company which makes the mytaxi app for ordering taxis in the US and Europe. The customer data gathered through the apps will be used to develop autonomous technologies and connected cars.
BMW's partnership with Intel and Mobileye	BMW plans to use the partnership to create an open standard platform for self-driving cars with the aim of putting vehicles on the road by 2021. Intel will assist BMW in chip design and hardware. Mobileye will help develop advanced driver assistance systems (ADAS).
Continental's acquisition of Argus Cyber Security	Continental develops pioneering technologies and services for sustainable and connected mobility of people and their goods and has recently acquired Argus, the global leader in automotive cyber security. The acquisition will boost Continental's capabilities to develop and offer solutions and services to make mobility more intelligent and secure.
Uber-Volvo deal	Volvo will provide Uber with up to 24,000 XC90 vehicles between 2019 and 2021 with a deal expected to be worth $1.4bn. The deal provides opportunities for Volvo to position itself as the autonomous driving supplier-of-choice for ride-sharing services around the world.
Ford's partnership with Lyft	Ford plans to deploy its self-driving cars on Lyft's ride-hailing platform by 2021. Both companies will share data, decide target cities, develop an infrastructure plan for vehicle dispatch and build proper technical support for Ford vehicles using Lyft's system.

The private sector has made considerable investments for developing driver-assisted and autonomous vehicle technologies, while governments around the world have supported technological development through policies, funding arrangements and building supporting infrastructure.

Key government initiatives

Many countries are actively developing autonomous vehicles, but the level and intensity of their activities vary. Countries such as US, UK, Germany and Japan are already testing varying levels of autonomous vehicles.

Some key government initiatives globally are highlighted below:

US: The Obama administration in 2016 proposed spending about $4 billion over a decade to develop self-driving cars. The investment plans to develop real-world pilots to increase the safety of autonomous vehicles.

UAE: Dubai has committed to having 100 autonomous vehicles on its roads by 2020. It is targeting 25 per cent of all transportation to be smart and driverless by 2030, rising to 90 per cent of vehicles being electric, self-driving cars by 2035.

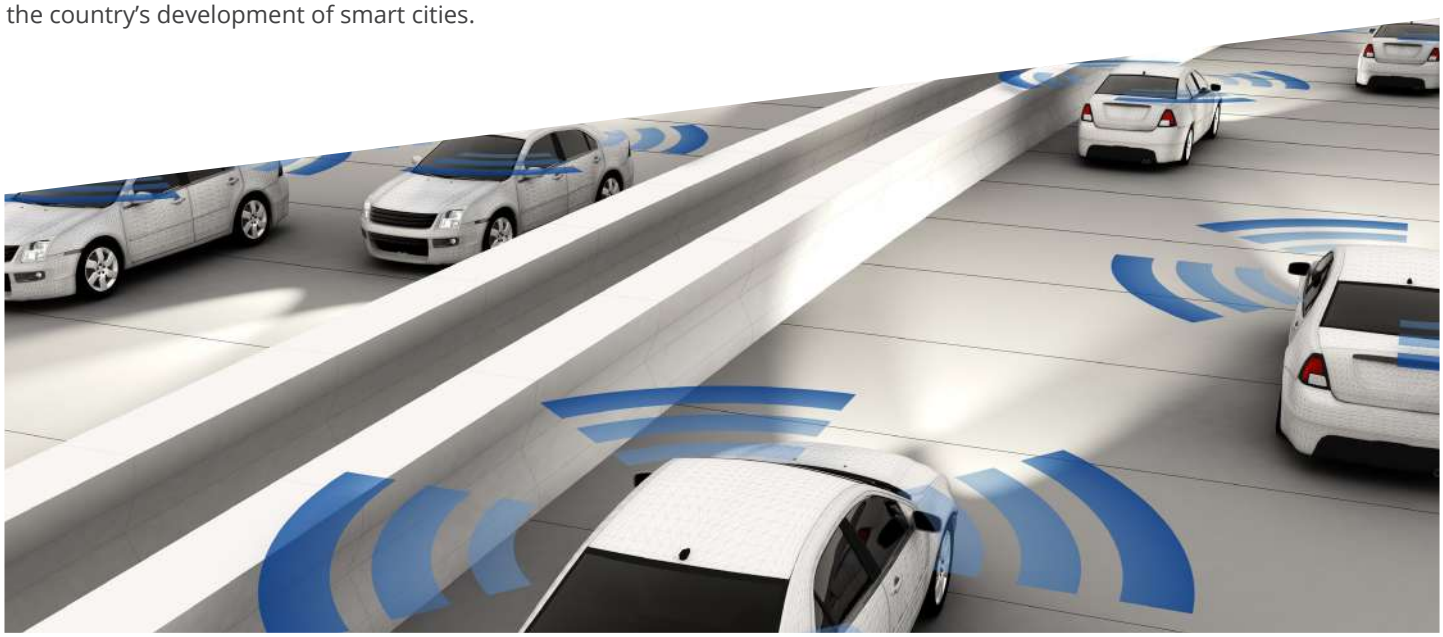
Japan: As a part of its "fourth industrial revolution" initiative, the Japanese government is aiming for autonomous cars to account for 20 per cent of all vehicles on its roads by 2030.

China: The country is targeting partially autonomous cars (driver assist) to account for half of all sales by 2020, with highly automated (not quite fully autonomous) cars to contribute 15 per cent of sales by 2025 and for one-in-10 vehicles sold to be fully autonomous within 2030. Baidu's Apollo autonomous driving program is being developed in conjunction with more than 50 automotive and technology firms around the world. Other developments include the Society of Automotive Engineers of China's 2030 roadmap which provides a clear framework in terms of single-technology infrastructure and standard for vehicles that would rapidly move China towards producing and selling self-driving cars.

Automakers are increasingly partnering technology companies to develop more advanced autonomous vehicles, with a focus on control-based technologies. At the same time, the industry has witnessed the mushrooming of smaller technology start-ups engaged in developing navigation, communications, and cyber security software and algorithms. This trend has also provided opportunities for component manufacturers to expand into sensor hardware, engine efficiency, driver safety, and hardware and software integration.

Some related companies are also acquiring ride-hailing start-ups as a strategy for acquiring consumer data critical to the development of future products and services.

There are many such forward-looking initiatives for autonomous vehicles in China. New infrastructure, high-speed rail and motorways are being constructed with autonomous cars as an integral part of these plans. Autonomous cars are also being incorporated into the country's development of smart cities.



AUTONOMOUS VEHICLES
INDIA'S LANDSCAPE

India's autonomous vehicle sector is at a nascent stage and has a very long way to go before autonomous vehicles become both a commercially viable and publicly accepted alternative to petrol and diesel vehicles, according to local automakers surveyed by Ipsos Business Consulting. Some semi-autonomous features are currently available within the high-end Indian luxury car segment, but the selection is limited and only accessible to a small, wealthy client base.

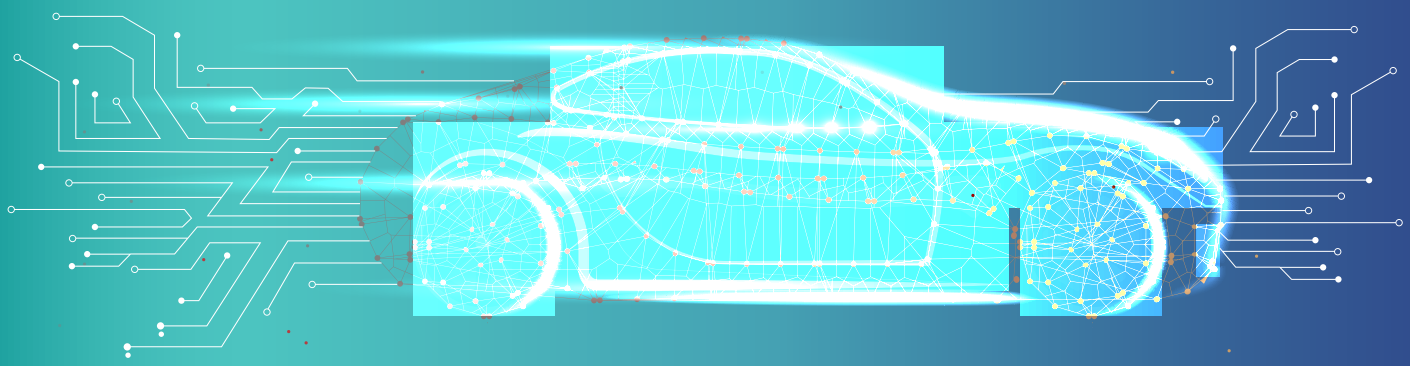
While India is expected to become the world's third-largest car market by volume within 2020, the development and adoption of autonomous vehicles is expected to lag far behind, mainly due to a lack of quality traffic data and supporting infrastructure.

Development of autonomous vehicles in India is being spearheaded by key local automakers, such as Mahindra & Mahindra and Tata Motors. Government support includes policies such as the Motor Vehicles (Amendment) Bill 2016, which will permit autonomous vehicle testing.

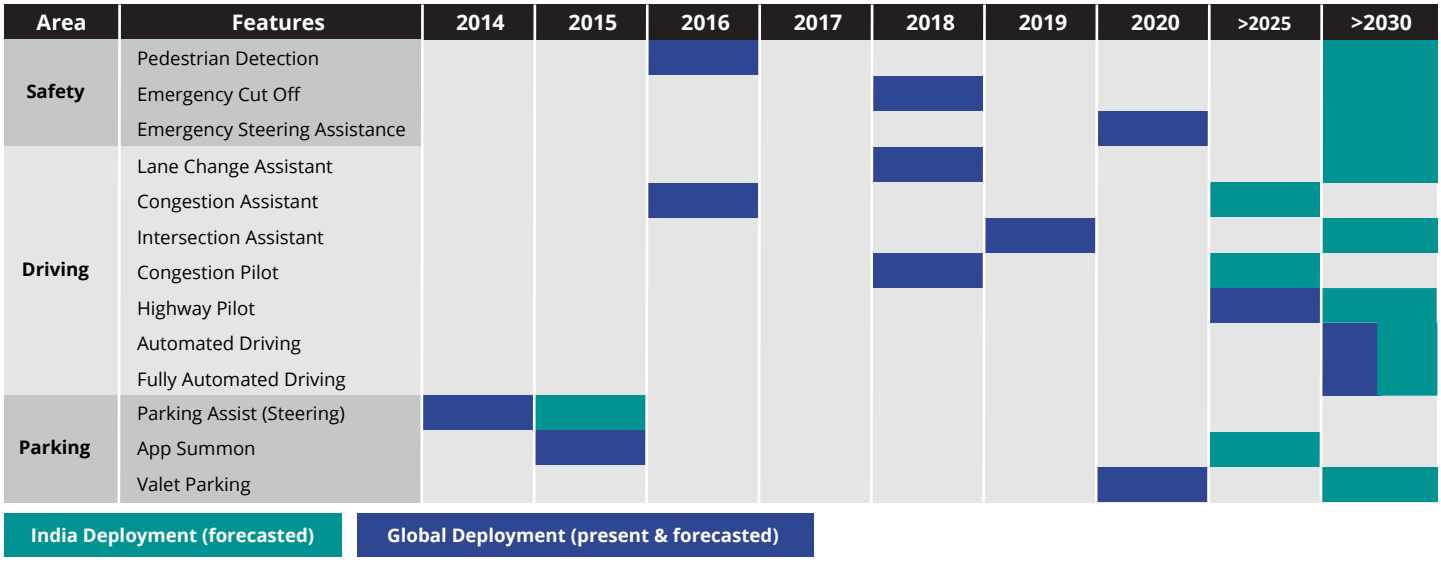
Key autonomous vehicles initiatives in India include:

- Proposed amendments in the Motor Vehicles (Amendment) Bill 2016 to permit autonomous vehicle testing.
- Automotive Research Association of India and Cognizant Technologies are co-developing India's first indigenous autonomous car prototype which should start testing soon.
- Tata Motors is also working on the autonomous cars framework in India and developing semi-autonomous vehicles.
- Minda iConnect and Microsoft India's recently announced strategic collaboration to locally develop connected vehicle technologies and enhanced driving experiences. Combining a range of initiatives and technologies, including artificial intelligence and the Internet of Things, the two companies will work on both private and commercial vehicles. Key goals for the next two years will include real-time benchmarking of driving behaviour, real-time coaching, and vehicle-to-vehicle and vehicle-to-infrastructure communication.

Ipsos Business Consulting research reveals how Indian automakers are responding to the development of key autonomous driving features, both in India and globally. Some features, such as pedestrian detection, lane-changing assistance and assisted parking are currently being offered in luxury cars produced by BMW and Tesla in western countries. In India, assisted parking is only available in selected luxury cars. Other features are currently being tested and will be rolled out from 2018–19.



Autonomous vehicles feature deployment: Global vs India (Indian carmakers' perspective)



Source: Ipsos Business Consulting Analysis

Indian companies will be challenged to reduce their time to market from design to roll out. They currently lag global carmakers who benefit from global production and supply chains.

There are currently more than 25 research and development centres within the Indian auto sector, which accounts for about 10 per cent of domestic R&D expenditure.

India needs to focus on the following key areas to catch up with autonomous vehicle development in other markets:

1. Greater collaboration and funding from the government, industry associations and automakers for start-ups developing autonomous solutions.
2. Clearer government policies to support the development, testing and roll out of electric and autonomous vehicles.
3. Increased focus and state funding for roads and traffic infrastructure critical to the development of autonomous vehicles and related systems.
4. Creation of domestic intellectual property by attracting leading talent and experts from advanced markets, such as the US and EU to develop capacity and capabilities for developing batteries, powertrains and hardware and software integration.
5. More public-private partnerships between city developers, driving infrastructure and solution providers, automakers and government.
6. Increased acquisitions and partnerships between automakers and other companies involved in the development of software, microchips, GPS and navigation.
7. Development and implementation of a policy to phase out petrol and diesel-powered vehicles to make space for electric and autonomous platforms.
8. Developing network of industry, academic and government experts to improve R&D capabilities.

THE FUTURE LENS

India's auto industry is at an inflection point. While it is set to become one of the largest automobile markets by 2020, stringent environmental regulations are forcing the government and stakeholders to go beyond conventional combustion engine-powered vehicles to offer electric powertrains by 2030. The government wants to halve India's dependence on oil imports by 2030, as well as reduce carbon emissions as a part of its commitment to the Paris Agreement.

Autonomous vehicle technology currently available in India is limited to features such as assisted parking, which are only offered in a few luxury car models. Shoddy roads and weak traffic infrastructure, poor driving habits and a rigid consumer mind-set are other factors affecting the development of fully autonomous vehicles in the country.

The successful development, testing and rollout of autonomous vehicles will face challenges in three key areas: automakers, government policy and consumer mind-set.

Challenges faced by Indian automakers

Challenge	Description	Strategic Imperative
Time to Market	Indian manufacturers take around 3 to 5 years to develop new platforms from design to rollout. International manufacturers benefit from global platforms through which they can more rapidly adapt suspension, change designs and powertrains to comply driving requirements and conditions in their various markets.	Modularisation of features, powertrain development and improvements and ADAS development will be critical for product differentiation.
Capability Development for AI & Software Integration	Indian manufacturers will not be able to launch autonomous vehicles without the ability to integrate AI and connected software into their models. This will require many firms to adapt their business model from being only a manufacturer to a "system integrator" hybrid model.	Greater interaction and partnerships with industry, academia and start-ups. Using M&As to build AI and software integration capabilities.
Talent	Indian companies will face a stiff challenge in attracting and acquiring talent for AI and software integration.	
Pricing and Viaility	Indian customers are highly price-sensitive. It will be challenging to roll out autonomous vehicles for mass consumption at prices that are both affordable and sustainable. Limiting autonomous features to luxury cars is unlikely to be viable in the long run.	Modularisation of platforms, features and powertrains. Greater integration with tier-1 suppliers.
Support infrastructure	Digital and physical support infrastructure is critical for autonomous vehicles to be successful. Integrating autonomous vehicles into existing traffic, driving and road conditions will be challenging for local manufacturers.	Greater need for public-private partnerships to develop support infrastructure. Increased focus on developing mobility service solutions, such as charging stations.
Technology and supplier development	Quality control, warranties for parts, new technology localisation, and cost optimisation of Hybrid and Autonomous Technology will be significant challenges faced by OEM in the medium to long term	Greater emphasis on integrating tier-1 suppliers and manufacturers. Increased focus on quality control programs. Manufacturers and suppliers to invest more in supplier capability development programs.

Source: Ipsos Business Consulting Analysis

Policy related challenges

Challenge	Description	Strategic Imperative
Government Sales Tax (GST) on hybrid vehicles	GST Council has proposed a maximum duty for hybrid cars. They will attract an additional 15 per cent levy above the standard 28 per cent GST rate, the same as large luxury cars and sports utility vehicles. Such sudden shifts in policy make international automakers wary of investing in India. This forcing many local manufacturers to revise plans for launching full hybrid powertrains. Manufacturers offering mild hybrids (vehicles that are mostly powered by internal combustion engines) won't be significantly affected.	Greater collaboration between industry and government. Increased government focus on creating a business environment that will encourage manufacturers to switch to clean fuel technologies.
Smart City Program and Integrationg Autonomous Vehicle Technology	A major component of the Smart Cities initiative is developing efficient urban mobility and public transport system. The government has approved several large urban infrastructure development programs, most notably in road transportation. Other initiatives support development of smart fuel (hybrid and electric) vehicles and smart technologies, such as electronic stability programs, crash testing, smart cards, electronic toll collection and real time parking management. The slow pace of development will make it harder for India to keep up with other countries for smart cities and integrated transport development.	Greater need for the government to rapidly implement key Smart City initiatives Greater government focus on quality control

Source: Ipsos Business Consulting Analysis

Consumer perception challenges

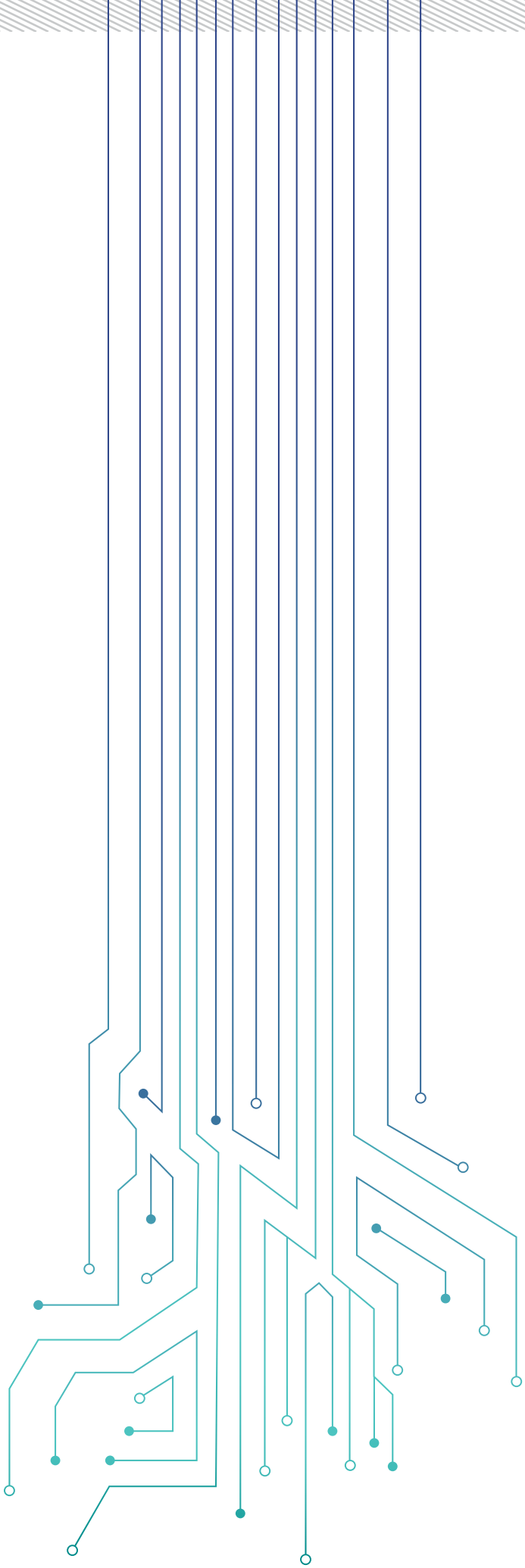
Area	Challenge	Description	Strategic Imperative
Consumer Challenge	**Changing consumer mindsets and earning their trust in autonomous vehicle technology**	Consumers need to be educated about autonomous vehicles with the onus on Indian manufacturers to successfully demonstrate the new technology and its benefits. Key challenges are justifying Lifetime Value (LTV) and Cost of Ownership (TCO) of the new technology compared current vehicles platforms. Manufacturers will also need to make a compelling case for private ownership given the rising popularity of shared mobility platforms.	Better monitoring and understanding of consumer preferences and their willingness to pay for the technology across segments. Increased focus on marketing safety-related technology through feature offerings to consumers. Prioritisation of investments in safety-related technology development versus powertrain development will be a critical choice for Indian manufacturers. Greater recognition of demographic and geographic preferences amongst customers.

Source: Ipsos Business Consulting Analysis

Indian automakers face several challenges to the successful rollout of autonomous platforms. There is a greater need for a modular approach (focusing on different areas of autonomous vehicle development at the same time) to reduce time to market, acquiring capabilities across artificial intelligence, safety technology software integration, development of critical digital and physical infrastructure, and quality control for components in this transformation.

The success of Indian manufacturers will depend on how well they prioritise investments across autonomous feature and safety-based technologies. Government needs to expedite the implementation of necessary driving conditions through increased collaboration between states and central government, and via public-private partnerships. Manufacturers also need to successfully demonstrate the benefits of the new technology to the value-focused Indian consumers.

The government is reluctant to allow fully autonomous cars in India, fearing major job losses for drivers. Even if the government allows driverless vehicles on Indian roads, it won't be easy to integrate them into city traffic. Because of these challenges, both Indian and global manufacturers have placed India at the far end of the list of countries likely to get self-driving cars in near future.



How

CAN WE OPTIMISE
our business model to leverage
our market position?

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