Changing face of Mobility

## *Advancement in ITS and Way Forward*

January 2021

# " Mobility is the key driver of economic development in our cities.

*Emerging technologies will be extensively used to enhance capabilities of mobility systems to deliver services which are **accessible, efficient, reliable, safe, economical** and **environment friendly***

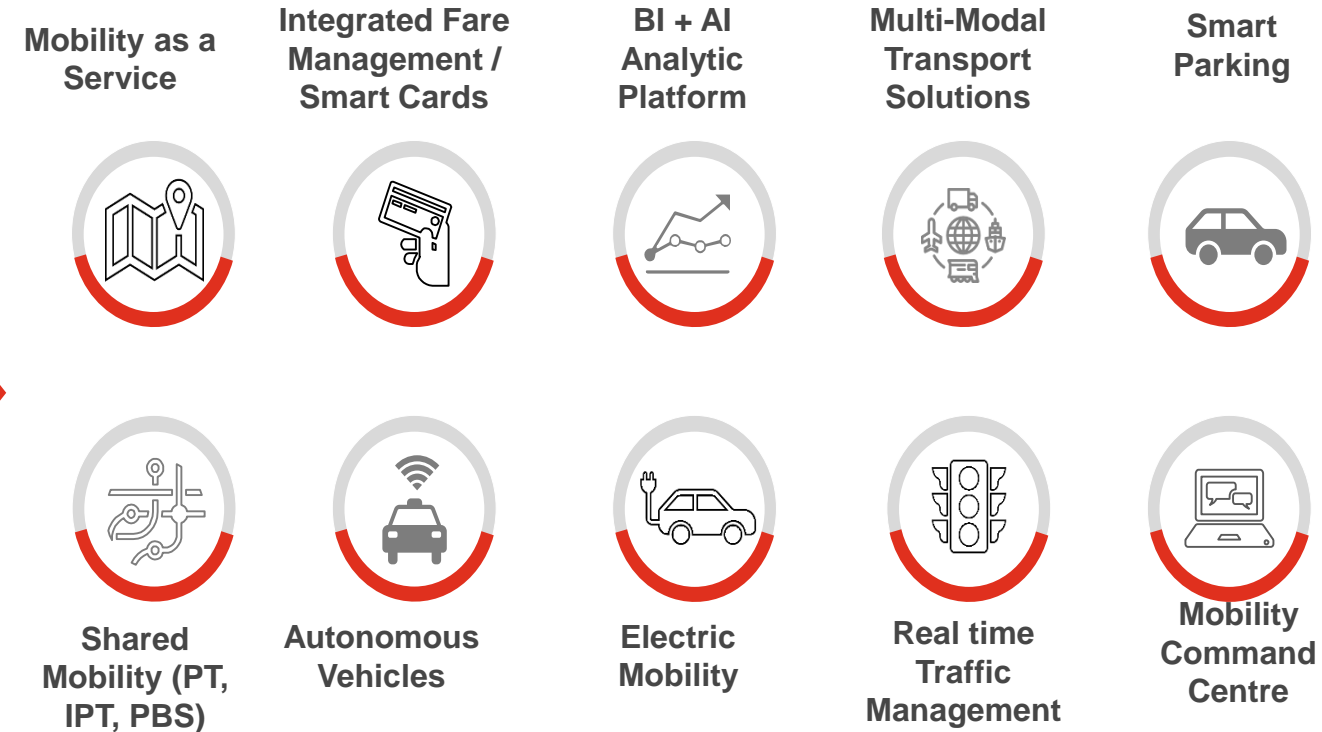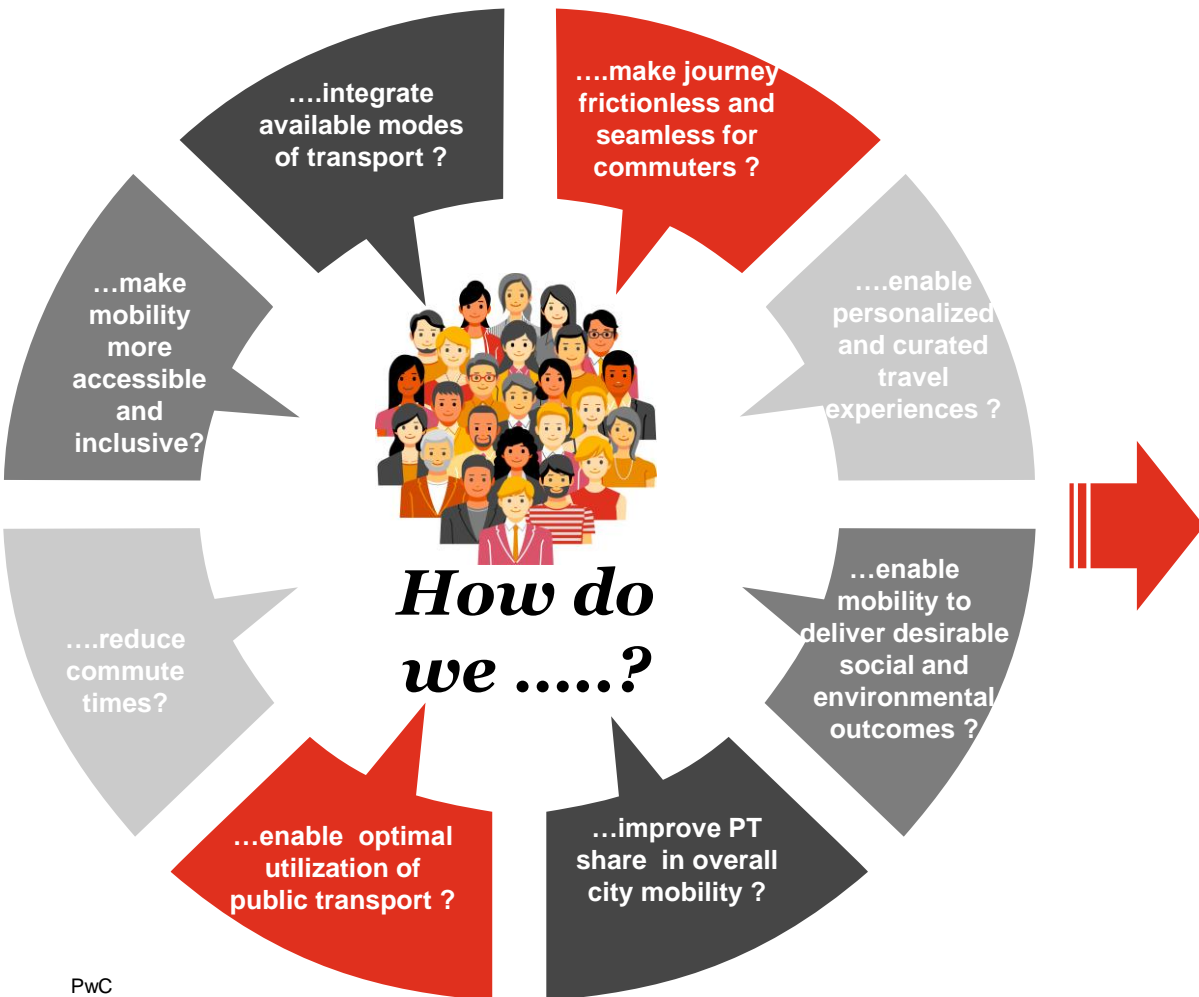*These are significant opportunities in itself for Technology provider's to solve.*

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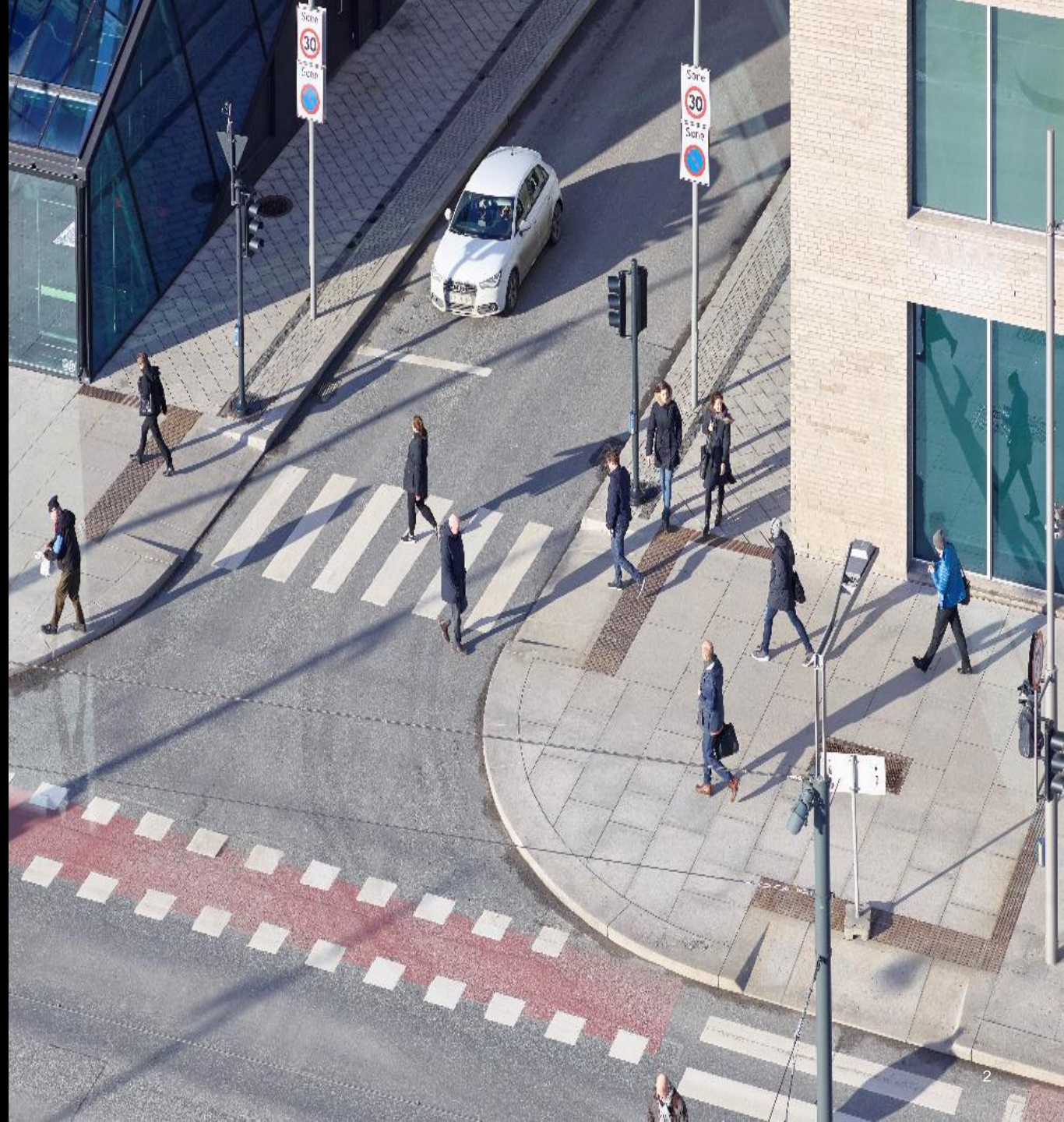
The commuters today require access to new age mobility system which is **highly consumer centric, integrated, personalized** *and* **reliable.**
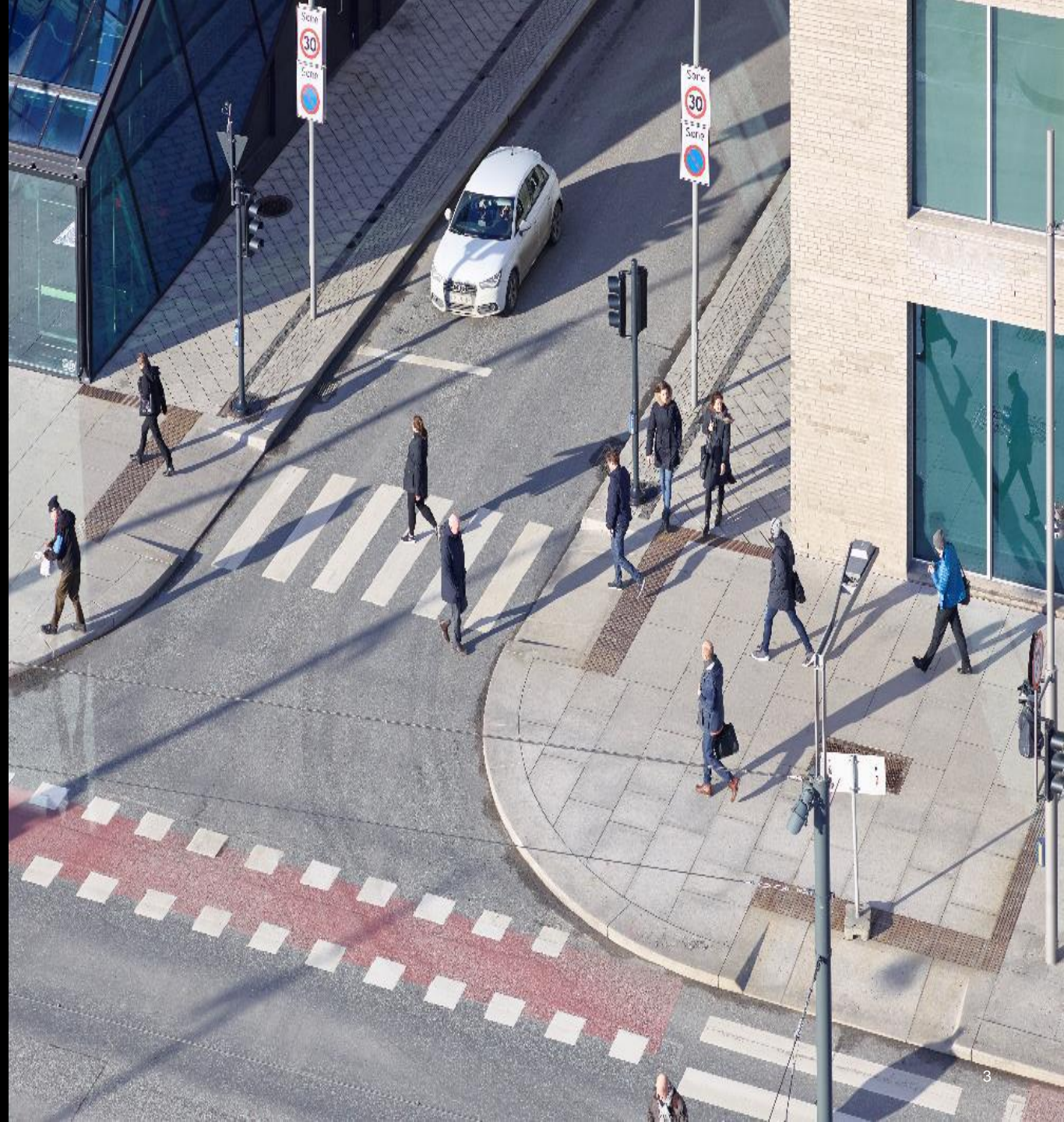
Keeping the Commuter at the center, the Cities are looking at digitally enabled ecosystem to solve for......

Cities are actively looking at solutions addressing *critical urban mobility issues* around ….

And respond by deploying *digital point solutions* to solve…

….integrate available modes of transport ?

….make journey frictionless and seamless for commuters ?

….enable personalized and curated travel experiences ?

…make mobility more accessible and inclusive?

…enable mobility to deliver desirable social and environmental outcomes ?

….reduce commute times?

How do we …..?

…enable optimal utilization of public transport ?

…improve PT share in overall city mobility ?

Mobility as a Service

Integrated Fare Management / Smart Cards

BI + AI Analytic Platform

Multi-Modal Transport Solutions

Smart Parking

Shared Mobility (PT, IPT, PBS)

Autonomous Vehicles

Electric Mobility

Real time Traffic Management

Mobility Command Centre

The *'digital first'* startups are actively involved in solving....

Focus Areas

Shared Mobility
Creating new markets
- Ride Share / Car Pool
- Vehicle Share
- Park Share

Ride-sourcing Platforms
Disrupting informal markets
- Car
- Auto rickshaw
- Van/Bus

Commuter Experience
Driving new businesses
- Driver Training
- Transit Apps
- Easy Payments

Vehicle and component Innovation
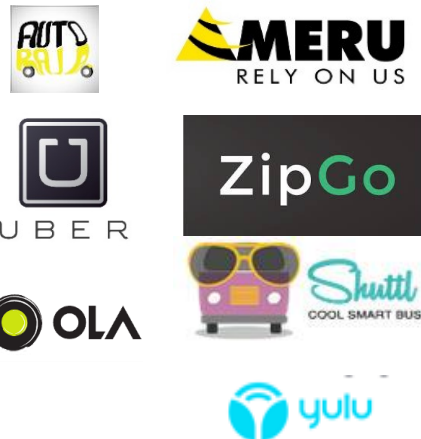Changing human behavior
- Vehicle Design
- E-Mobility

Data Driven Decision Making
Optimizing systems and processes
- Fleet Management and Vehicle Tracking
- Connected Cars / IOT

Examples

Shared Mobility: RIDINGO, JustRide, orahi, revv, Self Drive, Constapark, Zoomcar, PParkE

Ride-sourcing Platforms: AUTO RAJA, MERU, UBER, ZipGo, OLA, Shuttl, yulu

Commuter Experience: ridlr, scoot, ixigo, मुंबई m-Indicator, I.O.C.S., zophop, META DRIVING SAFETY

Vehicle and component Innovation: SUN MOBILITY, chargegrid, e-Trio, eG, ADAPT MOTORS, Mahindra electric, Numocity

Data Driven Decision Making: Instafera.com, Research Labs, freightbazaar, Humotronix, CYRRUP, trackyo, RYDEASSIST

The established players are adopting 'an ecosystem approach' to solve...

Shared Mobility

Creating new markets

- Ride Share / Car Pool
- Vehicle Share
- Park Share

Ride-sourcing Platforms

Disrupting informal markets

- Car
- Auto rickshaw
- Van/Bus

Commuter Experience

Driving new businesses

- Driver Training
- Transit Apps
- Easy Payments

Vehicle and component Innovation

Changing human behavior

- Vehicle Design
- E-Mobility

Data Driven Decision Making

Optimizing systems and processes

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- Connected Cars / IOT

Shared Mobility

- **In March 2019, Hyundai** recently **invested $300 million in Ola**, increasing their value to nearly $6 billion.
- In December 2018, ANI Technologies Pvt. Ltd. (Ola) announced that it will invest $100.0 million in Vogo, scooter sharing company in India
- in June 2019, Volkswagen AG (India) entered into a partnership with Zoomcar India Pvt. Ltd. (Zoomcar) for leasing service

Ride-sourcing Platforms

Yulu-Bajaj partnership to improve mobility

Intel Acquires Moovit to Accelerate Mobileye's Mobility-as-a-Service Offering

- **Rapido** is expected to receive **$40 million** from investors.
- Quick Ride is thought to have received $15 million from Naspers.
- Bounce received $12.2 million in Series A funding

Commuter Experience

MG Motor India signs six new startups under its Developer Program and Grant

- The startups are Highway Delite, Socialcore, InCabEx, CamCom, ClearQuote, and the Alexa-based project Meeseeks

- India Automated Fare Collection Systems market is projected to grow at a CAGR of over 18% during 2018-2024

Vehicle and component Innovation

Bosch picks up 26% stake in SUN Mobility

- in 2018, **Uber** announced its investment in **Neutron Holdings Inc. (Lime),** an electric bicycle and scooter sharing service provider, as a part of a $335 million financing round led by GV (Alphabet Inc.'s venture arm).

Data Driven Decision Making

Reliance Jio To Finally Launch A Scalable Connected Car Solution Which It Has Promised For Years

Tata Technologies partners with FutureMove Automotive for connected mobility solutions

- Robert Bosch Engineering India Limited and Mercedes have partnered to launch the first connected autonomous car in 2021, with modules of V2V communication and car-to-infrastructure (V2X) are built here

Thus, the mobility of future is going to be different from what it is today...

Modern mobility demands the ability to move people and things to places effortlessly. This requires an ecosystem that harmonizes disparate technologies and people in meaningful ways to reduce negative friction.

Emerging Trends

- *Multi-modal transit environments*
- *Demand responsive transport system*
- *Vehicle usership over ownership*
- *Shared and Eco-friendly mobility*
- *User Equity*
- *Time Value of Travel*

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Trend Drivers

- *Artificial Intelligence and Machine Learning*
- *Mobile first Strategy*
- *Big Data analytics*
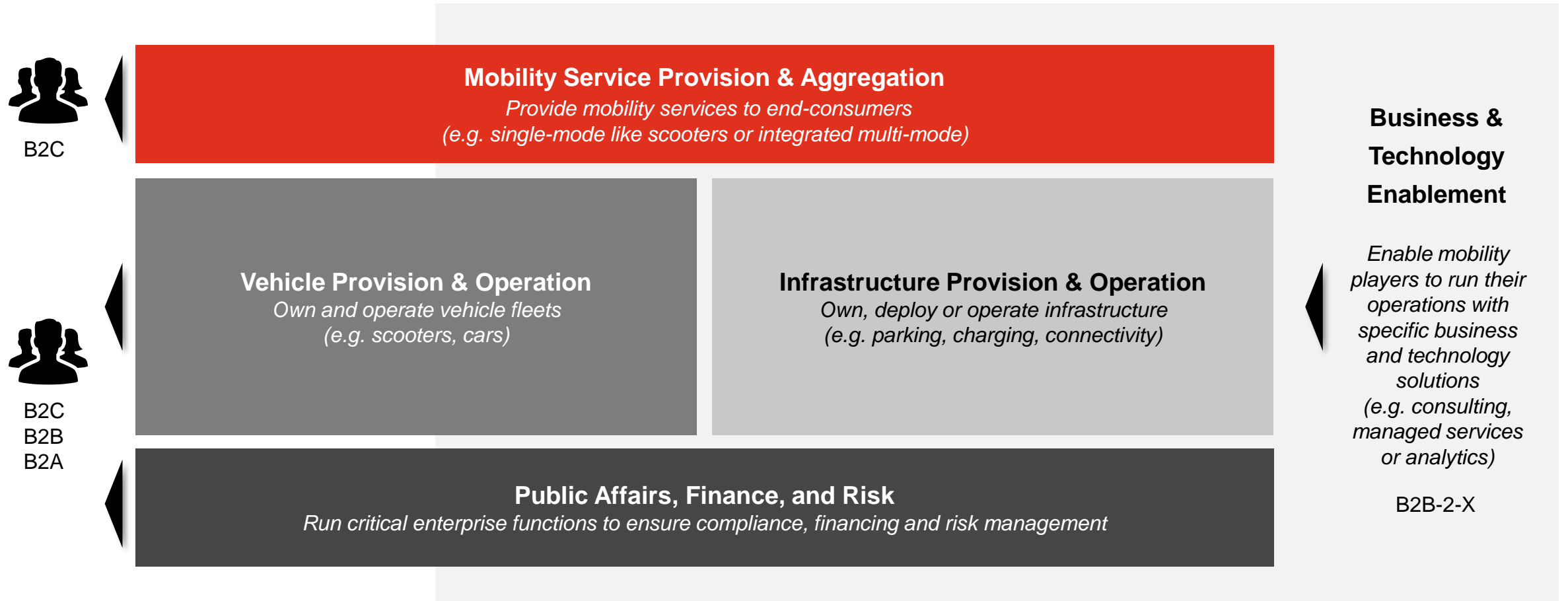- *Green technology advancement*
- *High Speed Communication*

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Future Mobility

- *Transit as a Service*
- *Self Driven Transit*
- *Connected City Transport*
- *Green Mobility*
- *Transit and Logistic Integration*
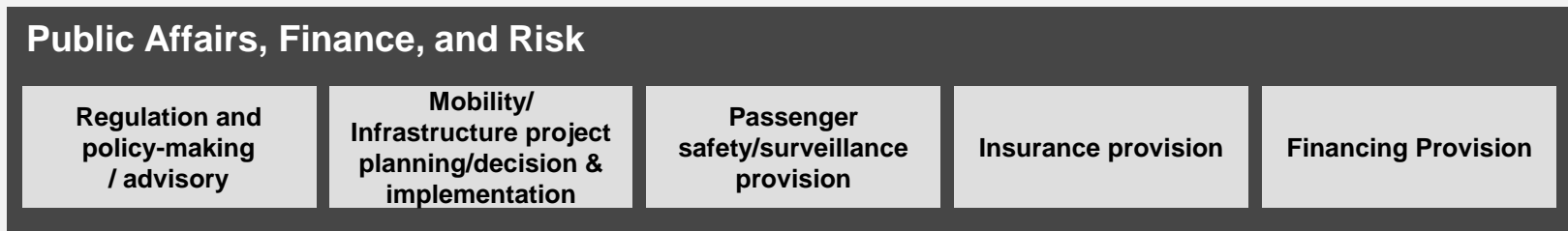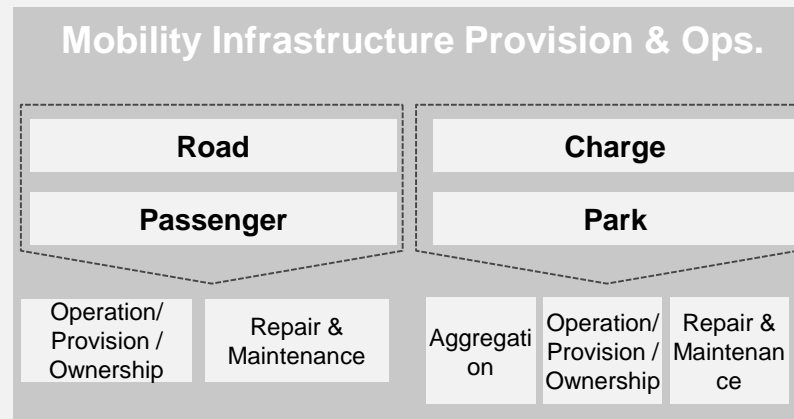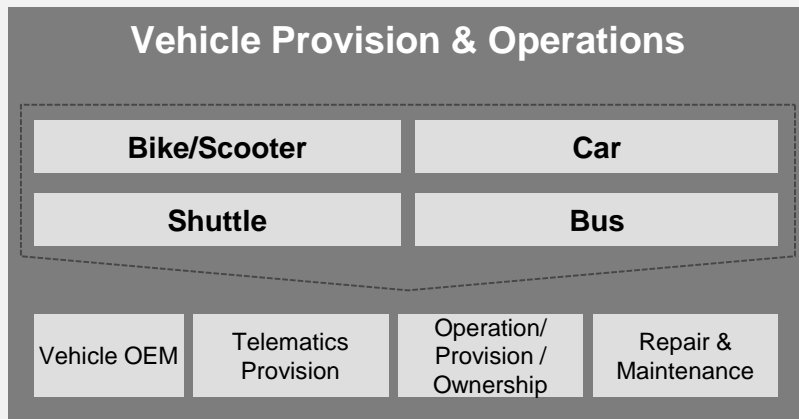- *Self Healing Transport Network*
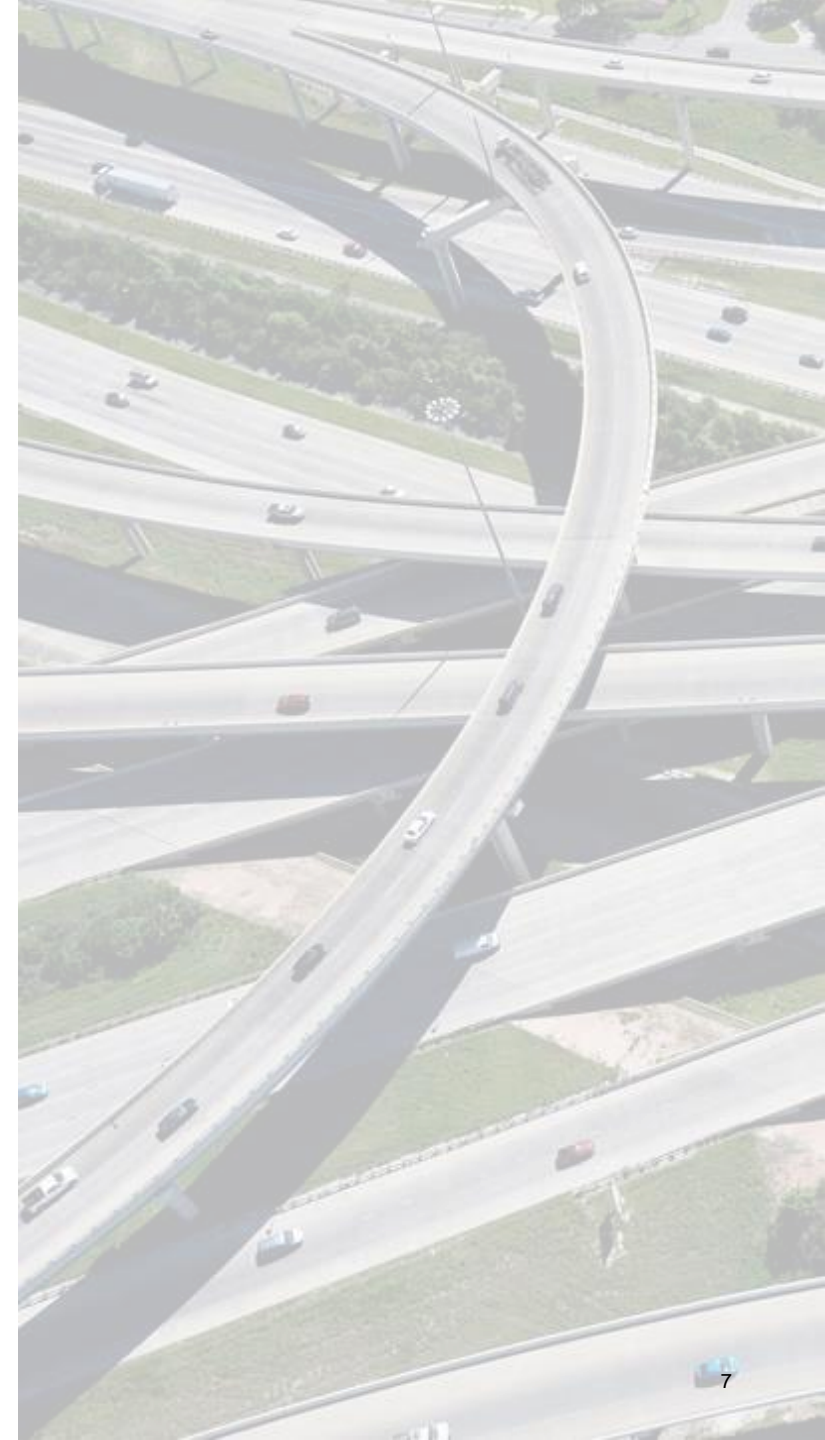
The mobility ecosystem is stacked up into 4 distinct value blocks and Technology as an enabling layer

B2C

Mobility Service Provision & Aggregation
*Provide mobility services to end-consumers
(e.g. single-mode like scooters or integrated multi-mode)*

**B2C
B2B
B2A**

Vehicle Provision & Operation
*Own and operate vehicle fleets
(e.g. scooters, cars)*

Infrastructure Provision & Operation
*Own, deploy or operate infrastructure
(e.g. parking, charging, connectivity)*

Public Affairs, Finance, and Risk
Run critical enterprise functions to ensure compliance, financing and risk management

Business & Technology Enablement

*Enable mobility players to run their operations with specific business and technology solutions
(e.g. consulting, managed services or analytics)*

B2B-2-X

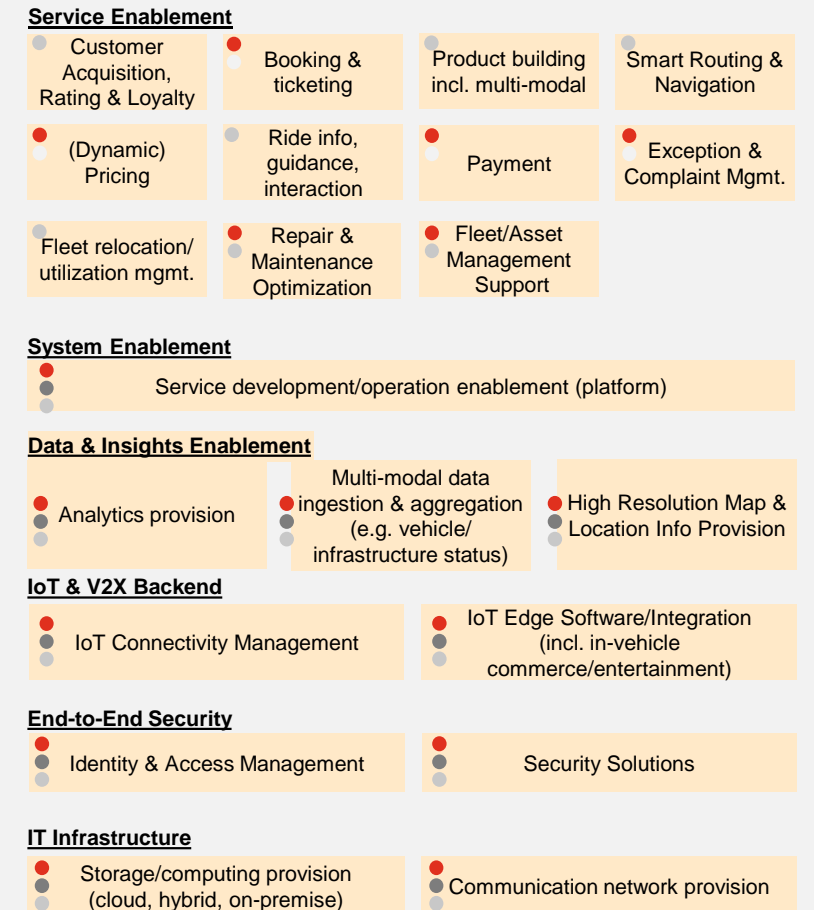# There are number of opportunities to play by converging different capabilities and support emerging mobility business models

There are number use cases under each value block which technology can solve and can act as reference point by MSFT to mark its entry or enhance its offerings

Mobility Service Aggregation

Routing-Only *(Multi- or Single Mode)*

Booking *(Multi- or Single Mode)*

Mobility Service Provision

Bike/Scooter *(Shared)*

Car *(Shared)*

Car + Driver *(Hailed)*

Shuttle + Driver *(incl. on-demand)*

Bus + Driver

Vehicle Provision & Operations

Bike/Scooter

Car

Shuttle

Bus

Vehicle OEM

Telematics Provision

Operation/ Provision / Ownership

Repair & Maintenance

Mobility Infrastructure Provision & Ops.

Road

Charge

Passenger

Park

Operation/ Provision / Ownership

Repair & Maintenance

Aggregation

Operation/ Provision / Ownership

Repair & Maintenance

Public Affairs, Finance, and Risk

Regulation and policy-making / advisory

Mobility/ Infrastructure project planning/decision & implementation

Passenger safety/surveillance provision

Insurance provision

Financing Provision

Business & Technology Enablement

Service Enablement

Customer Acquisition, Rating & Loyalty

Booking & ticketing

Product building incl. multi-modal

Smart Routing & Navigation

(Dynamic) Pricing

Ride info, guidance, interaction

Payment

Exception & Complaint Mgmt.

Fleet relocation/ utilization mgmt.

Repair & Maintenance Optimization

Fleet/Asset Management Support

System Enablement

Service development/operation enablement (platform)

Data & Insights Enablement

Analytics provision

Multi-modal data ingestion & aggregation (e.g. vehicle/ infrastructure status)

High Resolution Map & Location Info Provision

IoT & V2X Backend

IoT Connectivity Management

IoT Edge Software/Integration (incl. in-vehicle commerce/entertainment)

End-to-End Security

Identity & Access Management

Security Solutions

IT Infrastructure

Storage/computing provision (cloud, hybrid, on-premise)

Communication network provision

PwC

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Applicability of tech blocks to value block categories

The established players are entering the mobility space in different ways

Automotive OEMs

- In the past, OEMs across the board **acquired or developed mobility service providers,** typically starting with car sharing / ride-hailing
- However, given **tight budget** due to COVID-19 and ongoing invest needs for eMobility / autonomous driving, further extensions into mobility have slowed down
- Still, most OEMs are **investing partial stakes** on a broad range of innovative players via their **venture capital arms**
- **Maruti, Suzuki** plan to invest in startups in India to develop solutions for the shared mobility industry

Utilities and oil majors

- Energy companies are extending their electricity retail businesses by investing in **charging infrastructure**
- They cater to existing residential customers by **offering special EV charging tariffs** and even **brokering EV leases**
- Similar to OEMs, the **venture capital** arms of oil majors are investing partial stakes in broad portfolios of smart mobility assets **beyond charging**
- **BPCL** forays into swappable lithium-ion battery supply for electric vehicles and **Tata Power, HPCL** partner to set up electric vehicle charging stations
- **MG Motor India** ties up with **TES-AMM** for EV battery recycling
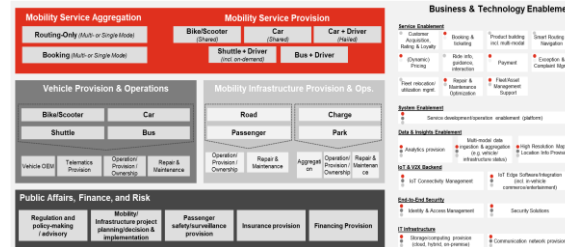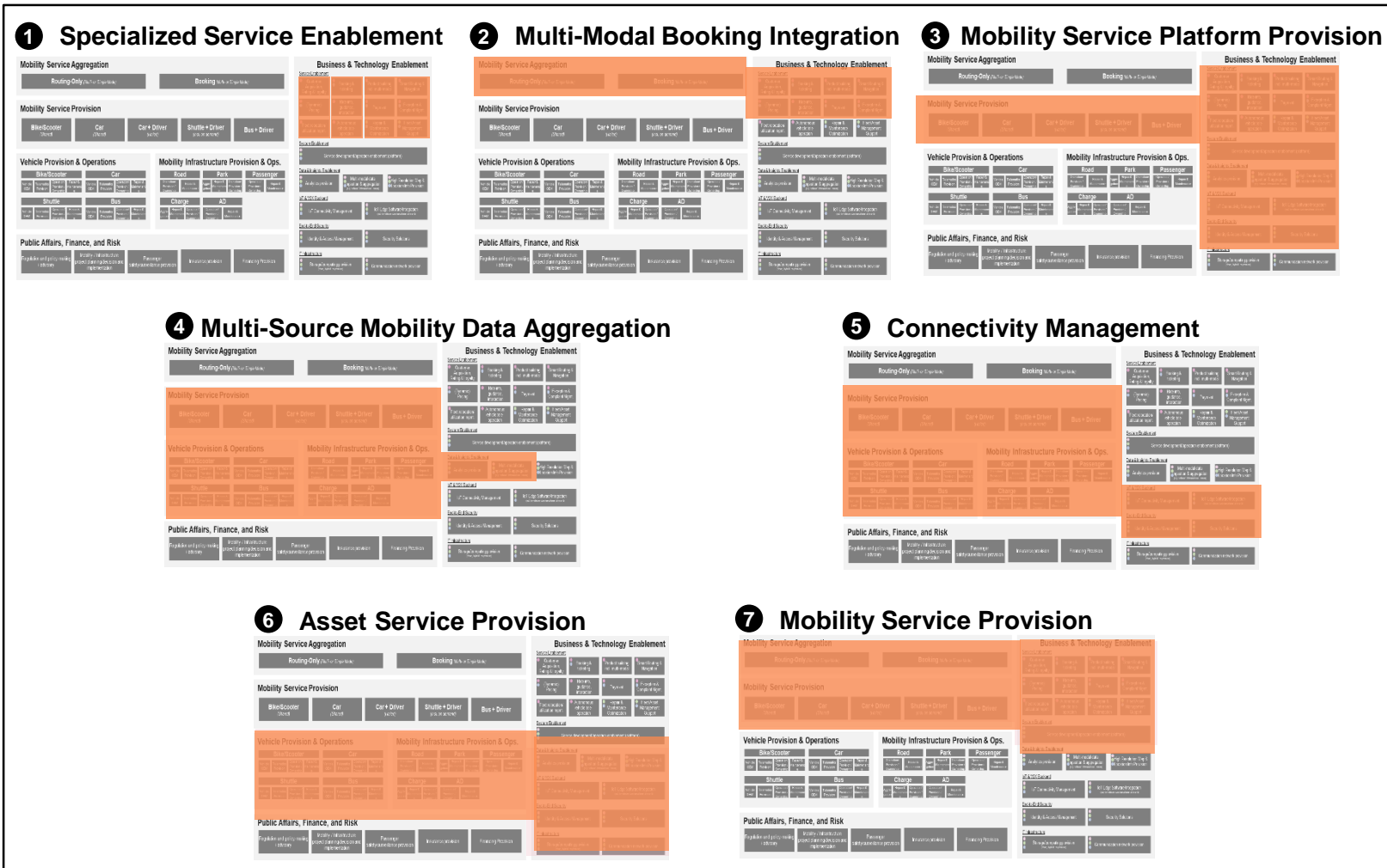
Industrials and electronics

- Industrials and electronics companies have sought to grow their revenue beyond vehicles / hardware by providing **IoT, data and system enablement**
- Industrial players like Siemens grew existing relationships from their infrastructure business with cities to offer **advanced real time traffic optimisation and multimodal payments**
- Electronics players like Cisco expanded beyond hardware to provide **IoT management and smart city platforms**
- **Skoda** introduces consolidated **MySkoda App, Intel collaborated with Ford,** with focus on developing improved camera-based collision warning, detecting vehicles and pedestrians, and lane-keeping features for its vehicles

Telecommunications

- Telecommunications companies (Telcos) underpin smart mobility through connectivity services – **5G rollout** enables significantly improved mobility solutions
- **IoT** is a new revenue channel, with clients ranging from OEMs, fleet managers and drivers (connected cars, telematics) to cities (connected sensors)]
- Telcos are also expanding their **data capabilities**, examples include data ingestion for smart cities and passenger flow analytics
- New models from **MG and KIA** are coming with factory-fitted connectivity features

Keeping the current developments in perspective; 7 promising areas of *"Platform play"* within Smart Mobility domain.


Play areas for MSFT

The narrative around a vehicle has witnessed a change from a *19" Alloy* and *"Under the Hood"* capability to overall *"Rider XP"*

Connected cars are those that have access to the Internet and a variety of sensors, and that are thus able to send and receive signals, sense the physical environment around them, and interact with other vehicles or entities [1]
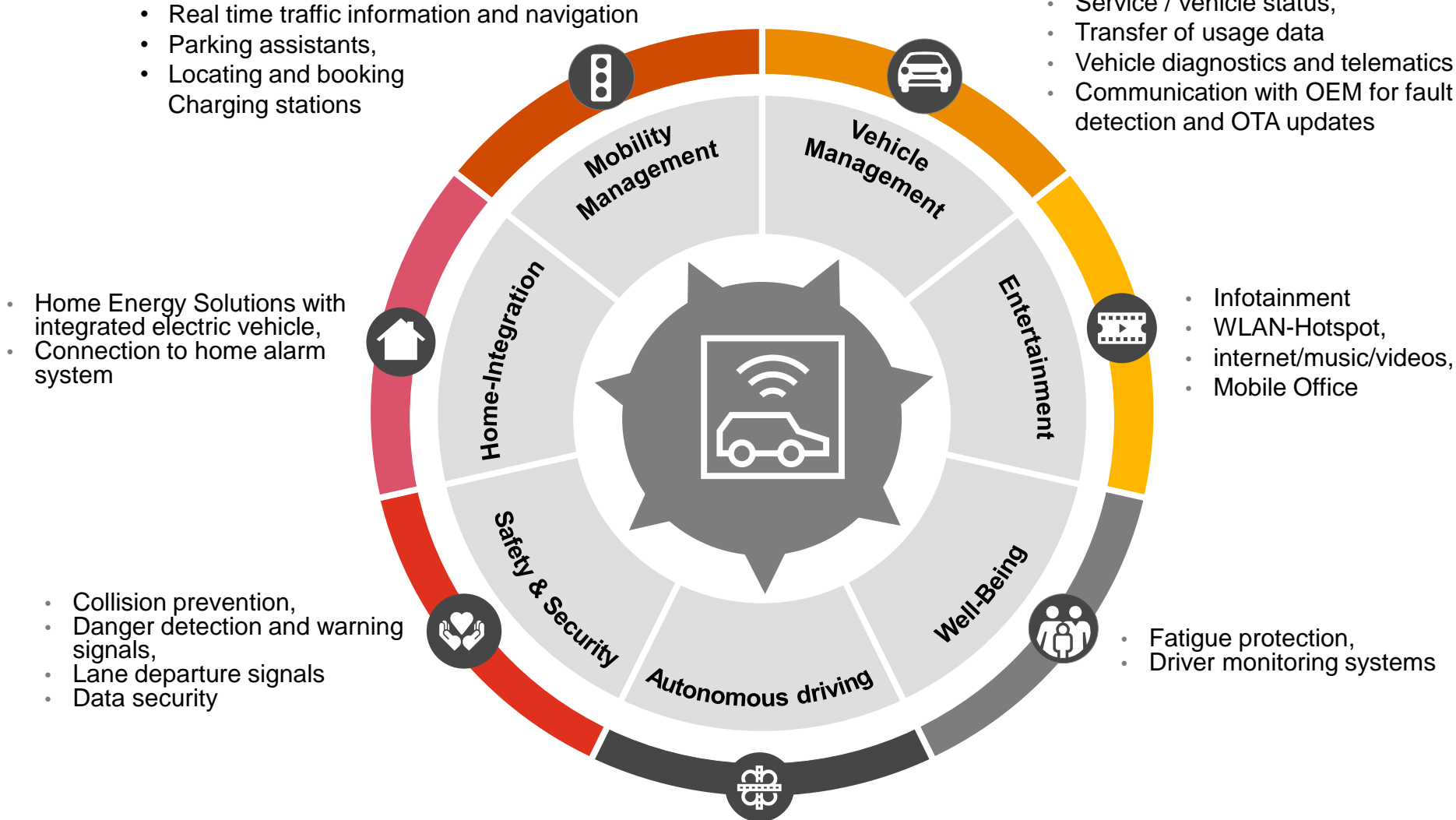
- Real time traffic information and navigation
- Parking assistants,
- Locating and booking Charging stations

- Service / vehicle status,
- Transfer of usage data
- Vehicle diagnostics and telematics
- Communication with OEM for fault detection and OTA updates

- Home Energy Solutions with integrated electric vehicle,
- Connection to home alarm system

- Infotainment
- WLAN-Hotspot,
- internet/music/videos,
- Mobile Office

- Collision prevention,
- Danger detection and warning signals,
- Lane departure signals
- Data security

- Fatigue protection,
- Driver monitoring systems

- Distance / park / motorway assistant

Mobility Management — Vehicle Management — Entertainment — Well-Being — Autonomous driving — Safety & Security — Home-Integration

MG's iSmart offers 50+ smart features which are a combination of hardware, software, connectivity, services and applications - making it an "Internet Car"
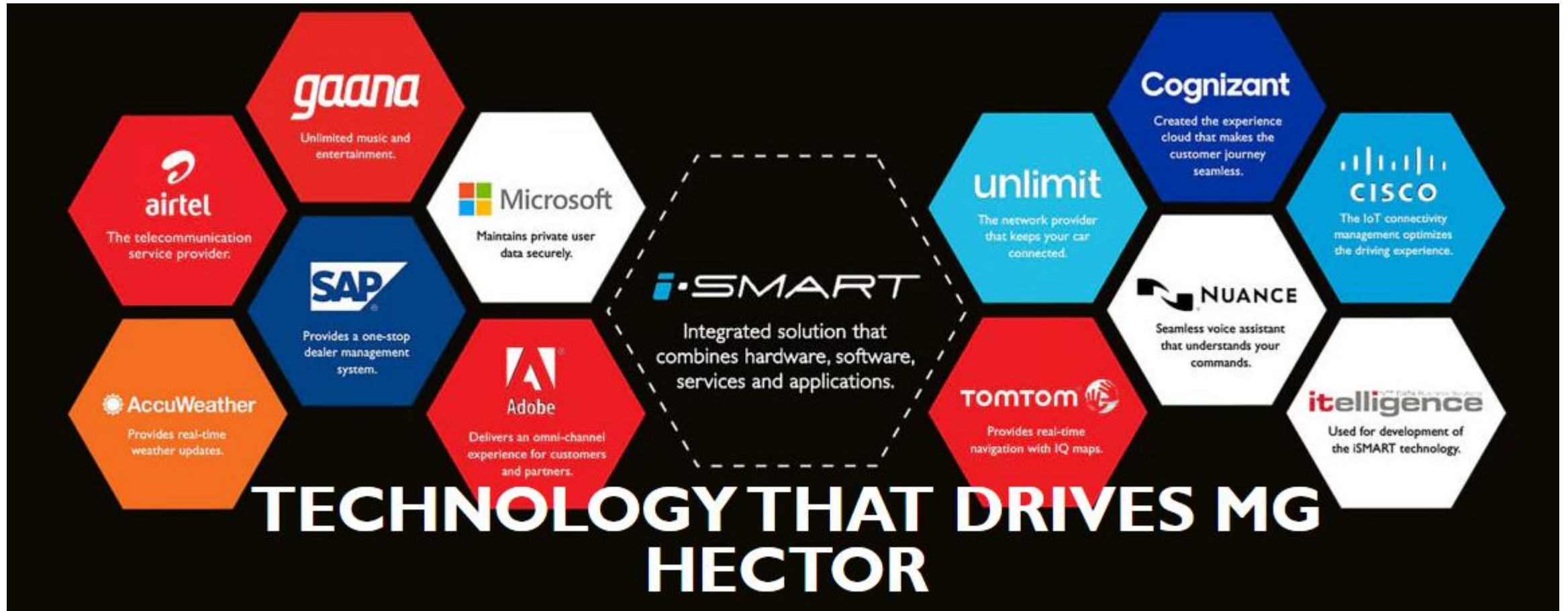
Organizations are embracing technology to improve response times in emergencies, citizen xp and catalyzing innovation

Focus Areas	**1. Safety, Security, and Crisis Management**	**2. Intelligent Administration**	**3. Asset Management**	**4. Knowledge and Innovation Management**
Driving trends	- Unmanned Aerial Vehicles - Cybercrime - Passenger Safety - Scanning Technology - Intelligent Driver Information System - Responsible AI	- Intelligent Process Automation - Virtual Assistants - Passenger Safety - Scanning Technology - Intelligent Driver Information Systems	- Digital Twins - Predictive Maintenance - Convergence - Industrial IoT - Edge Intelligence - Big Data - 5G Networks	- AI Skills and Education - Re-skilling - Massive Online Open Courses - AI Innovation Center and Research Institutions - Artificial Intelligence Conferences
Examples	• Utilizing AI for *improving the driving behavior* of bus drivers and *predicting bus driver accidents* • Use data to add predictive capability to *enhance response to traffic incidents* such as roadworks, congestion and other unplanned events.	• Improving the *efficiency and effectiveness of internal processes and research*, including natural language processing, computer vision, and machine learning-based predictive analytics. • Streamline and accelerates the journey from *raw data to actionable insights* • World's first AI lawyer, a *chatbot*, successfully contested 160,000 parking tickets across London with a success rate of 64% appealing over $4 million of parking tickets.	• Preteckt's systems in New York insights have the *potential to reduce time spent on maintenance*, prevent service disruptions and reduce fleet costs • Downer EDI Limited (Downer) has deployed a **Microsoft Azure AI** based intelligent solution that ingests sensor data from Sydney's fleet of Waratah trains to allow predictive maintenance *and data-driven decision making*	• *Transit Tech Lab* - is an accelerator program for start-ups solving public transportation challenges in New York • *Transport for NSW Research Hub* - fosters collaboration and information sharing between TfNSW, the tertiary sector, industry and other government agencies that are interested in transport and related research • *Research centres and hackathons* under Smart City initiative

In a Nutshell...

Areas of Play	Near term	Medium term	Long term
Mobility Services	• Specialized service enablement • Multi-modal booking integration • Mobility service platform provision	• Multi-source mobility data aggregation • Connectivity management	• City mobility solution stack
Mobility Vehicle	• Home Integration • Connectivity management • Driver safety and well being	• Mobility management with V2V, V2I and V2X connectivity	• Integrated Car OS • Data aggregation and analytics for optimized design and performance
Mobility governance	• Intelligent administration using process automation • Asset management	• Digital mobility governance stack • Improved CX in governance and regulatory services	• Mobility system operation improvement using data analytics and insights.

Thank you!

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