Future of New Mobility Business Models & Role of Cities as Facilitators

FROST & SULLIVAN

Changing Urban Demographics

Are Leading To Travel Problems That Today's Mobility Services Aren't Solving

Urbanisation

- Over **54%** of the World's population lives in cities, expected to rise to **67%** by 2050; urbanisation exceeds **80%** in OECD countries

Travel Problems

- Drivers spend **50** hours per year in congestion which stifles the economy of **1%** of GDP
- **7** million lives are lost prematurely due to air quality; mobility is the largest sector contributor

Insufficient Solutions

- Private cars are utilised **4%** of the time and account for **29%** of transport trips on average, but account for **85%** of our mobility expenditure

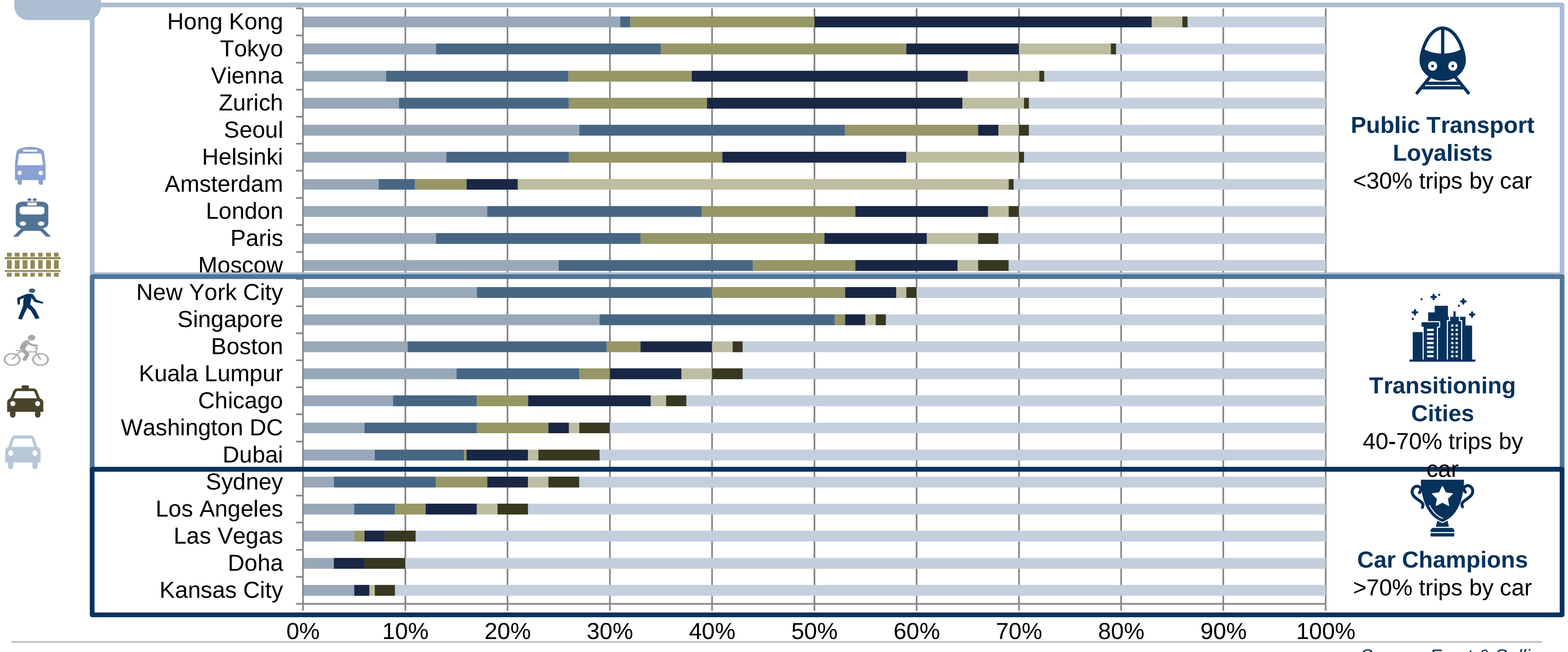
The global transportation market requires new mobility solutions

Sources: World Bank, World Health Organisation, Inrix, European Commission, Eurostat

Towards Sustainable Modes: Evolving Commuting Patterns across Cities

More than 70% of trips are made by Personal Car in Dubai- which adds to congestion and increase journey time by 29%

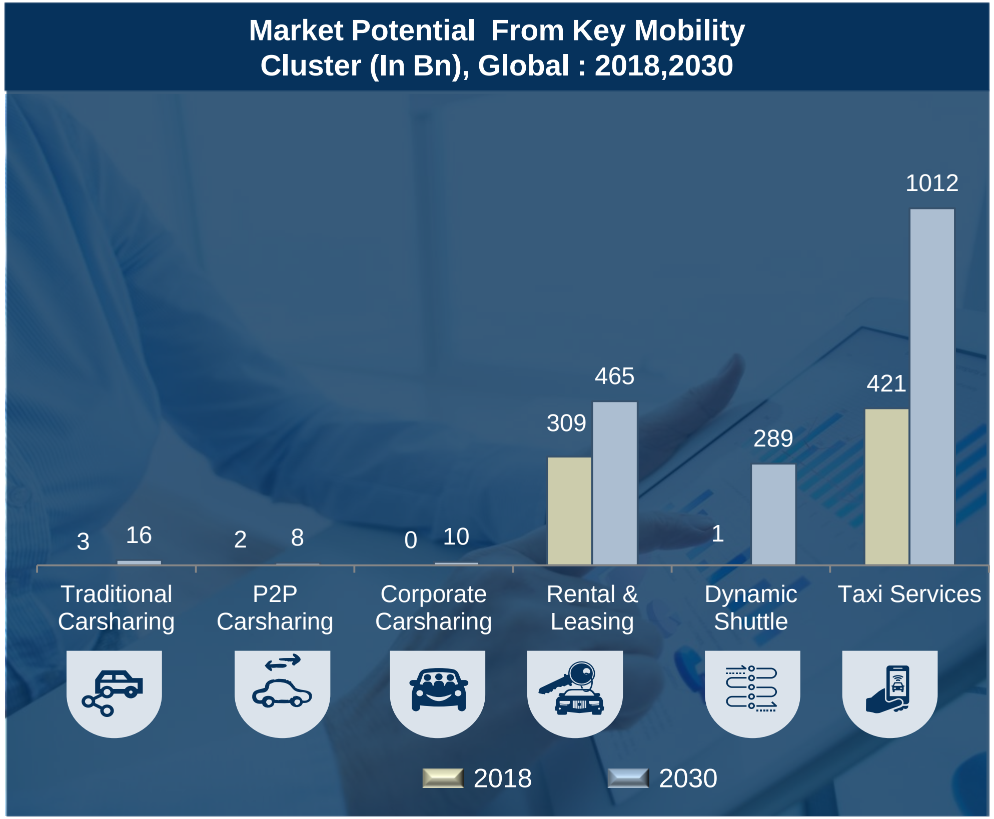
Percent Passenger Trips, By Modes of Transport, Select Cities

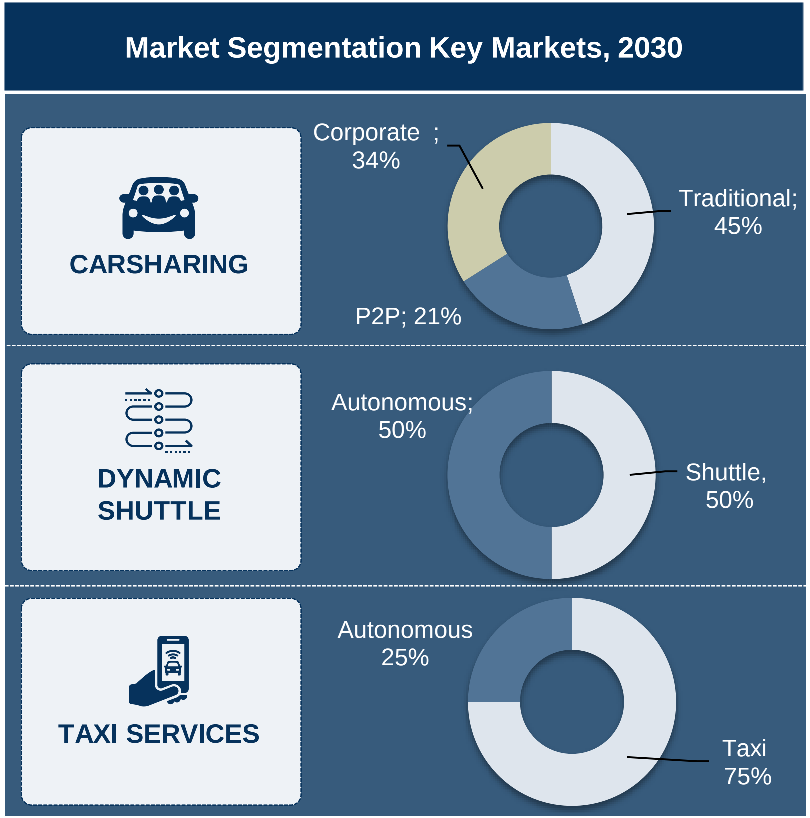


Source: Frost & Sullivan

New Mobility Solutions Market Will Grow to Around $2tr market by 2030

Revenue from the taxi cluster alone expected to exceed $1 trillion in 2030

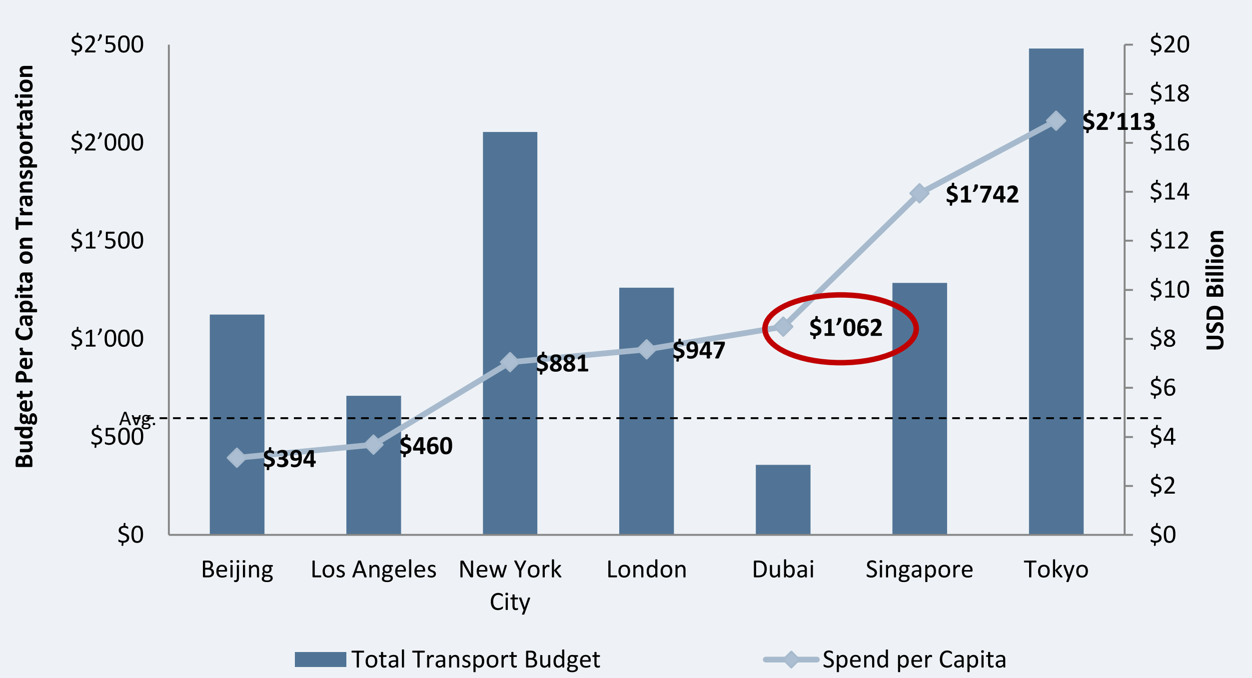




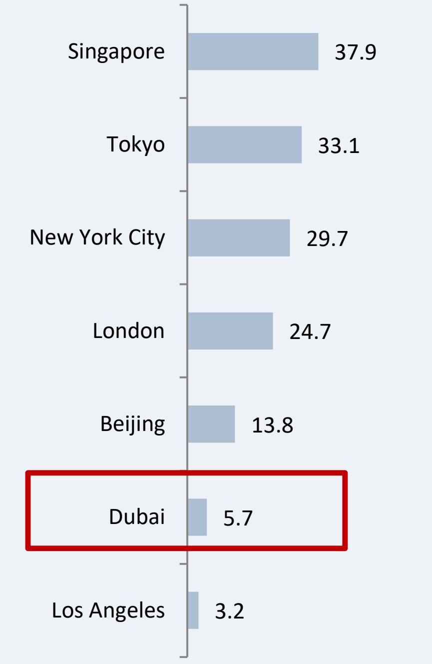
Transport Budget and Allocation on services vary significantly across Cities

The City of Dubai spends approx. $1,000 per capita for Transportation, 60% higher than global average

Annual Transportation Budget (USD Billion) & Budget Per Capita, Select Cities



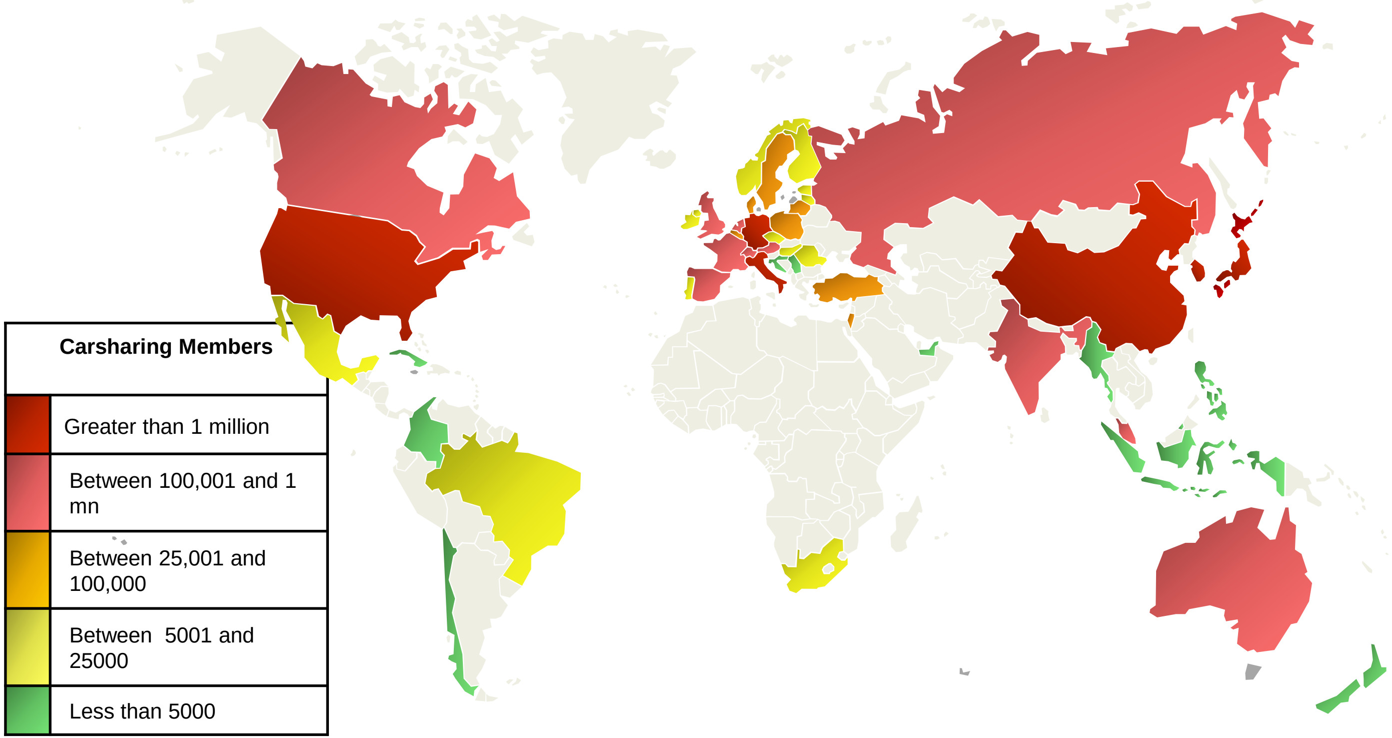
Rapid Transit Density, Kms/ Sq. Km Land Area



Heat map of Key Carsharing Markets

Germany and France alone account for around 50% of the overall carsharing membership in Europe; Germany has more than 2.5 million carsharing members.

Europe alone has close to 7 million members and 82k vehicles



	2018		2025
Revenue	$ 3 billion	→	$ 7 billion
Fleet	284k	→	630k
Members	27 million	→	51 million

Market Consolidations and Acquisitions

Electrification of Carsharing Fleets

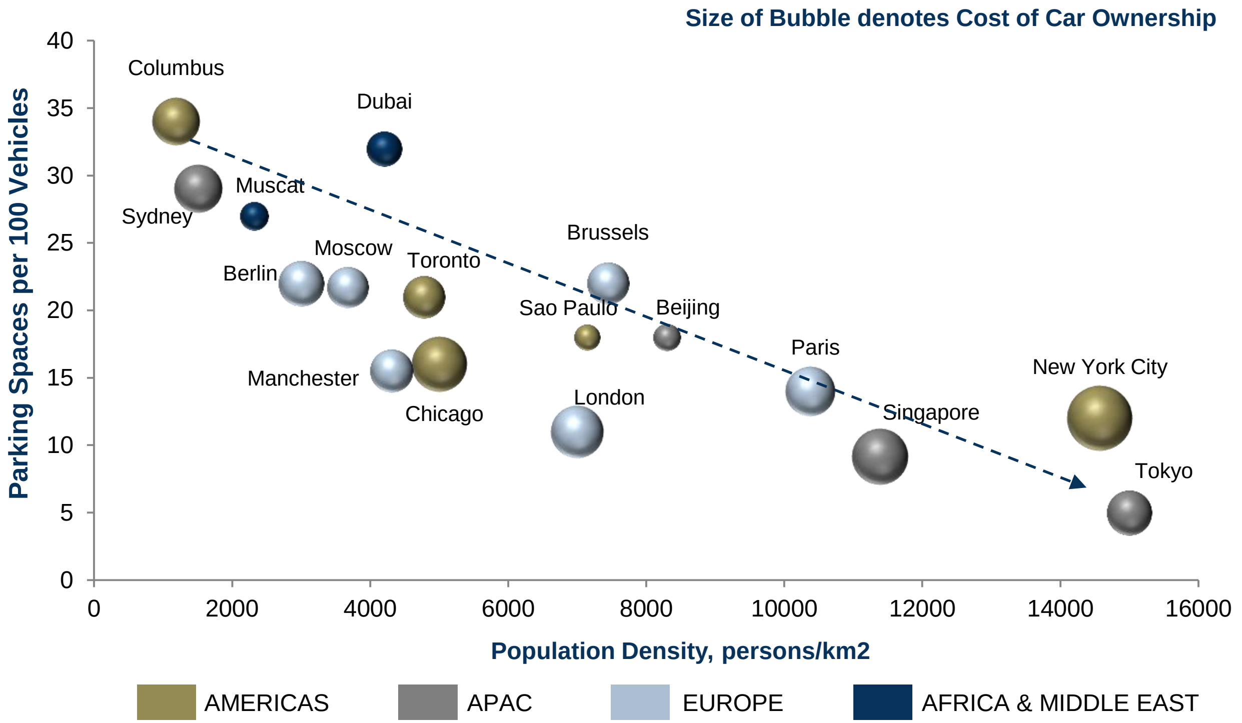
Partnerships between technology companies and OEMs to launch carsharing program

Source: Frost and Sullivan

Potential for Car Sharing scalability across city clusters

One car sharing vehicle can cater to 13 trips a day- an average 2 million trips are made daily by cars which offers 3X growth potential in car sharing fleet across the cities

Compare Population Density with Parking Spaces per 100 Vehicles



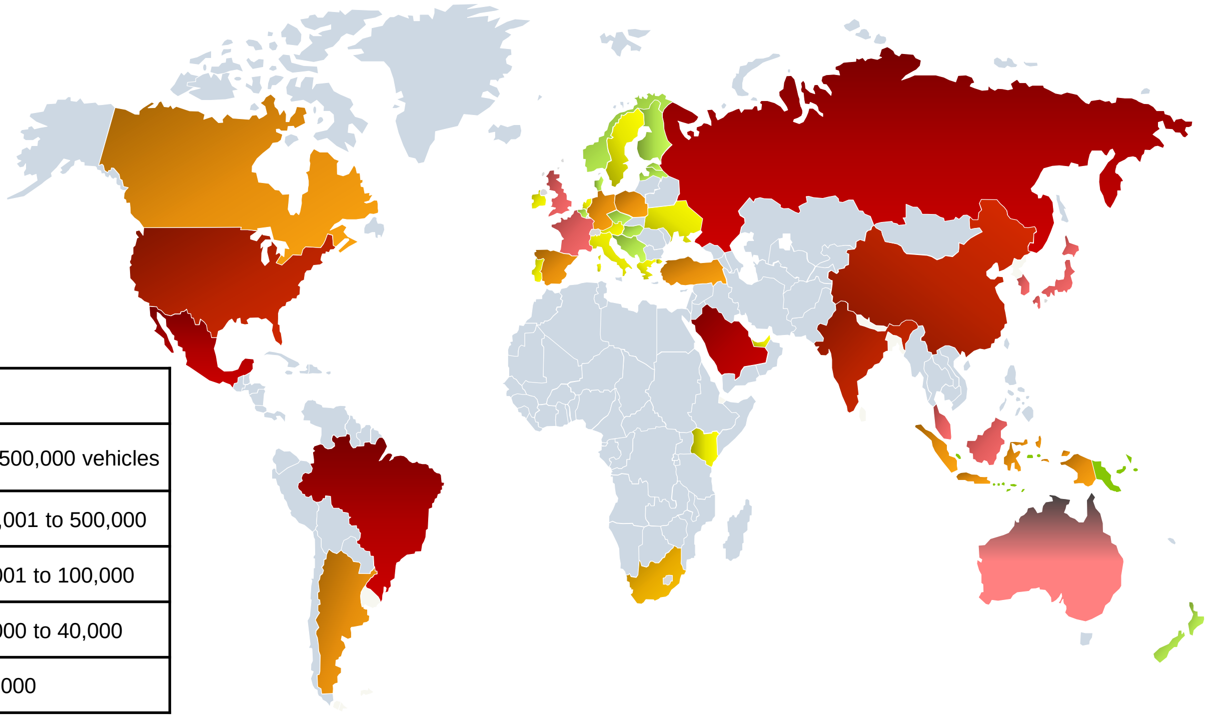
Carsharing Fleet Size

Source: Frost and Sullivan

Heat map of Key Ride Hailing Markets

Markets such as NA, EU, and APAC are entering the maturity phase with opportunities in tier 2 and 3 cities; LATAM, Africa, and ME are the new emerging hotspots

APAC is the biggest market with more than 7 million ride hailing vehicles



Taxi Fleet	
	Greater than 500,000 vehicles
	Between 100,001 to 500,000
	Between 40,001 to 100,000
	Between 10,000 to 40,000
	Less than 10,000

2018		2025
$ 625 billion	**Revenue** →	$ 1410 billion
14 million	**Fleet** →	28 million

E-hailing operators expanding to alternative business models

OEMs investing in EV fleets

AI & Technology Partnerships for fleet optimization, new business models & autonomous taxi capabilities

Regional monopolies

Source: Frost and Sullivan

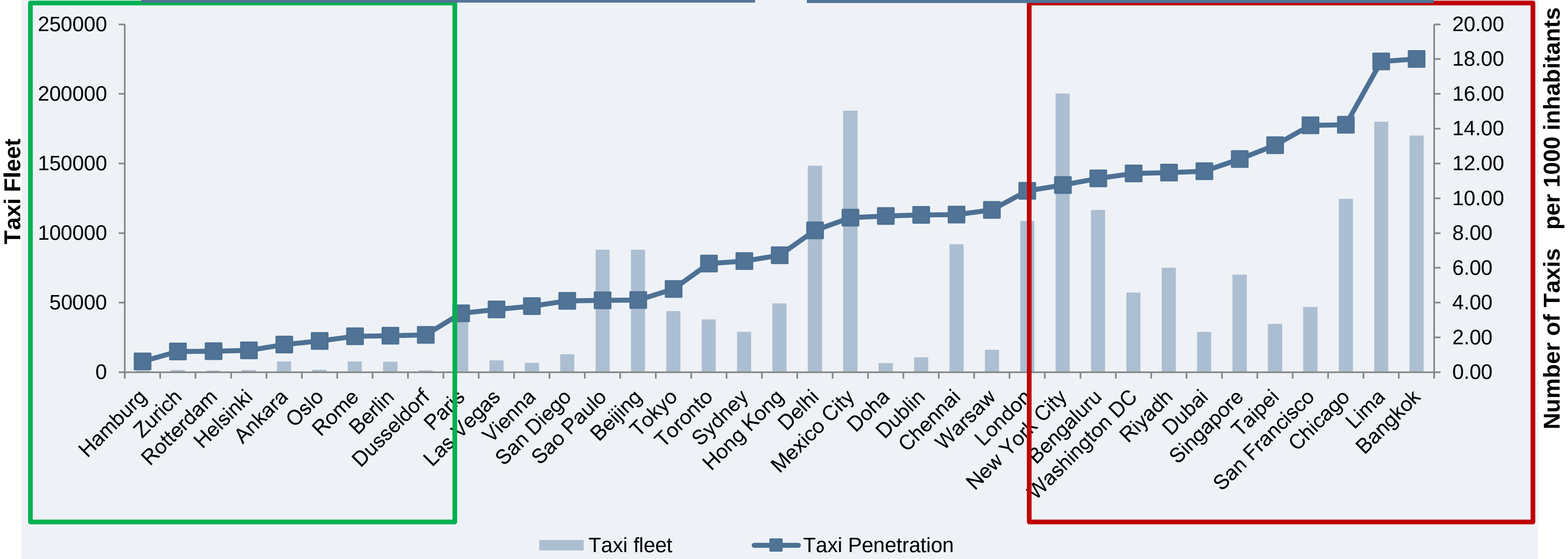
Taxi & PHV Fleet Penetration

Growth in the taxi market is expected to be determined by government intervention, particularly with respect to regulations and subsidies to shift to greener technologies

Taxi & PHV Fleet per 1000 inhabitants

Helsinki, Rotterdam, Hamburg, Copenhagen, Ankara- There is no ride-hailing presence in these cities.Rome only has Uber Black. (Helsinki resumed operations in July 2018)

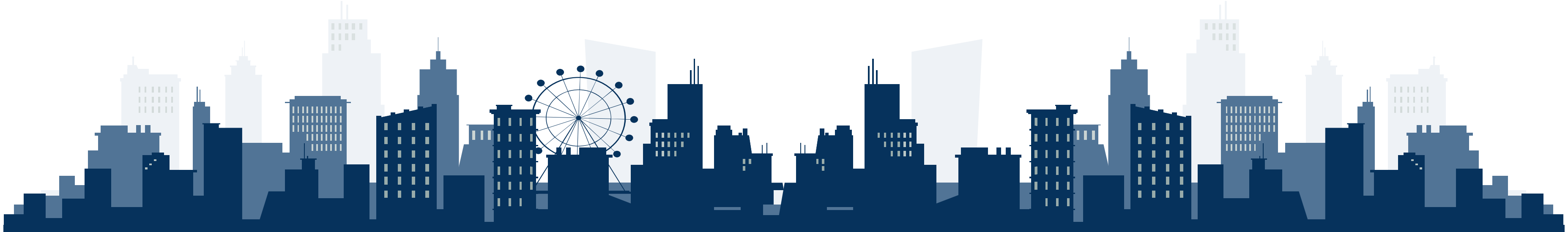
Cities such as Bangkok, Delhi, Mumbai and Bangalore- Regulations are open towards ride hailing market in turn bringing up the total taxi fleet



Source: Frost & Sullivan

30% Of Public Transit Networks To Become Demand Responsive By 2025

Public transit operators such as Arriva, BVG, and RATP have launched DRT operations independently. Cities are also actively pursuing alternative and sustainable mobility modes.



DRT MARKET KEY DEVELOPMENTS

	2018	2030
Market Revenue	~ $ 1 billion	~ $ 200 billion
Fleet Size	25k	4 million

	2018	2030
Market Participants	~40	~ 150-200
Market Expansion	EU – 76% NA- 1% APAC – 8%	EU – 20% NA- 15% APAC – 60%

By **2030**. Corporate shuttles &short distance dynamic shuttles to account for over **60%** of the market

In Europe , DRT services do not have well defined regulations and have to operate under taxi or PHV licenses.

Source: Frost and Sullivan

Diversification & Expansion By Mobility Service Providers

Shared mobility providers will gain ownership across the value chain, provide MaaS as a comprehensive and sustainable solution and offer more personalized mobility experiences for users.

Platform-ization and Mobility-as-a-Service

Owning the Value Chain

Personalized services

Financial Services

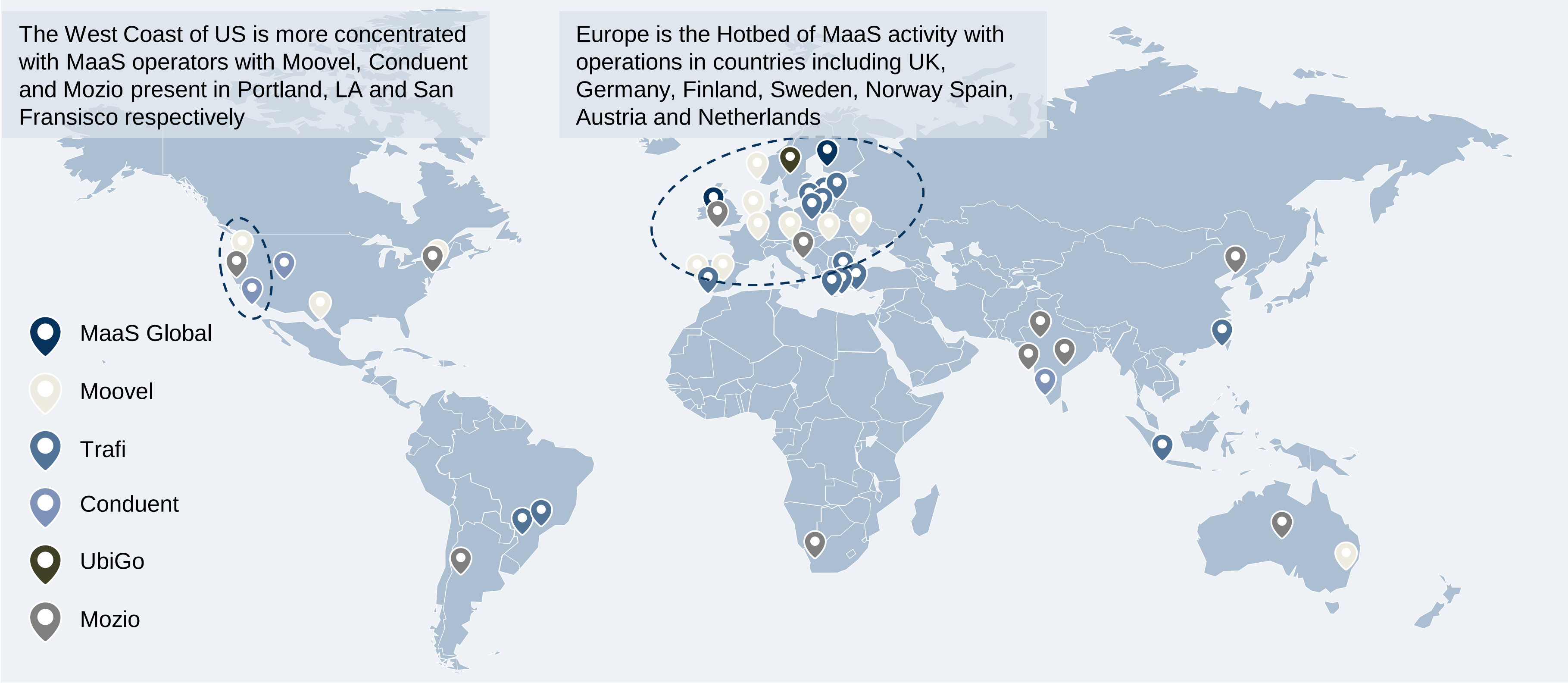
Future Capabilities of Mobility Providers

- Multi-Modal Mobility
- Fleet Management & Supply
- Platform and Technology
- Fleet Maintenance Services
- Smart Parking & Charging
- Unified Payments/ e-wallets
- Mobility Finance & Insurance
- Analytics & Data Services
- B2C, B2B and B2G Services

Source: Frost and Sullivan

Mobility as a Service (MaaS) Poised to Streamline Urban Mobility

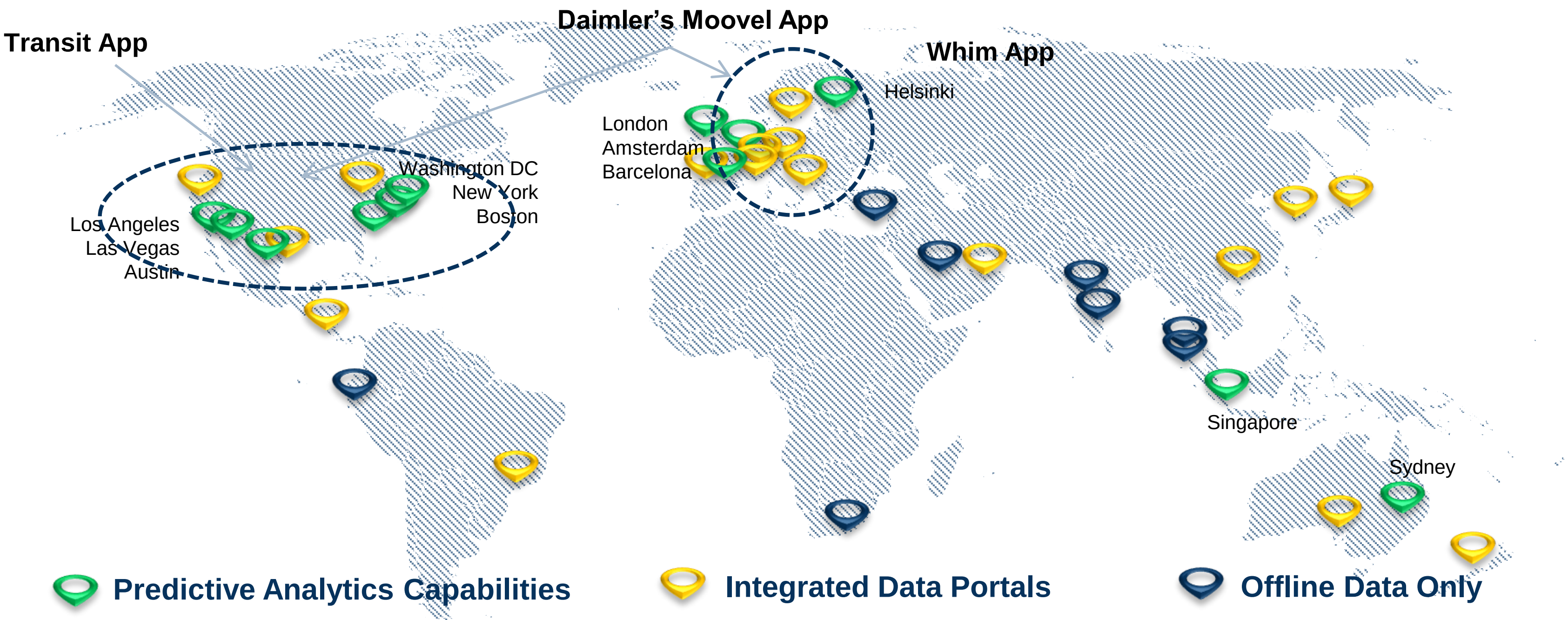
Pilots witnessed in more than 15 cities; collaboration between key stake holders and Standardized data sharing platforms to facilitate adoption



Source: Frost & Sullivan

Readiness of Cities for Service Integration and Digital Applications

European Cities are more prepared to launch Mobility-as-a-Service, due to the governments' push to mandate all transport operators to openly share data



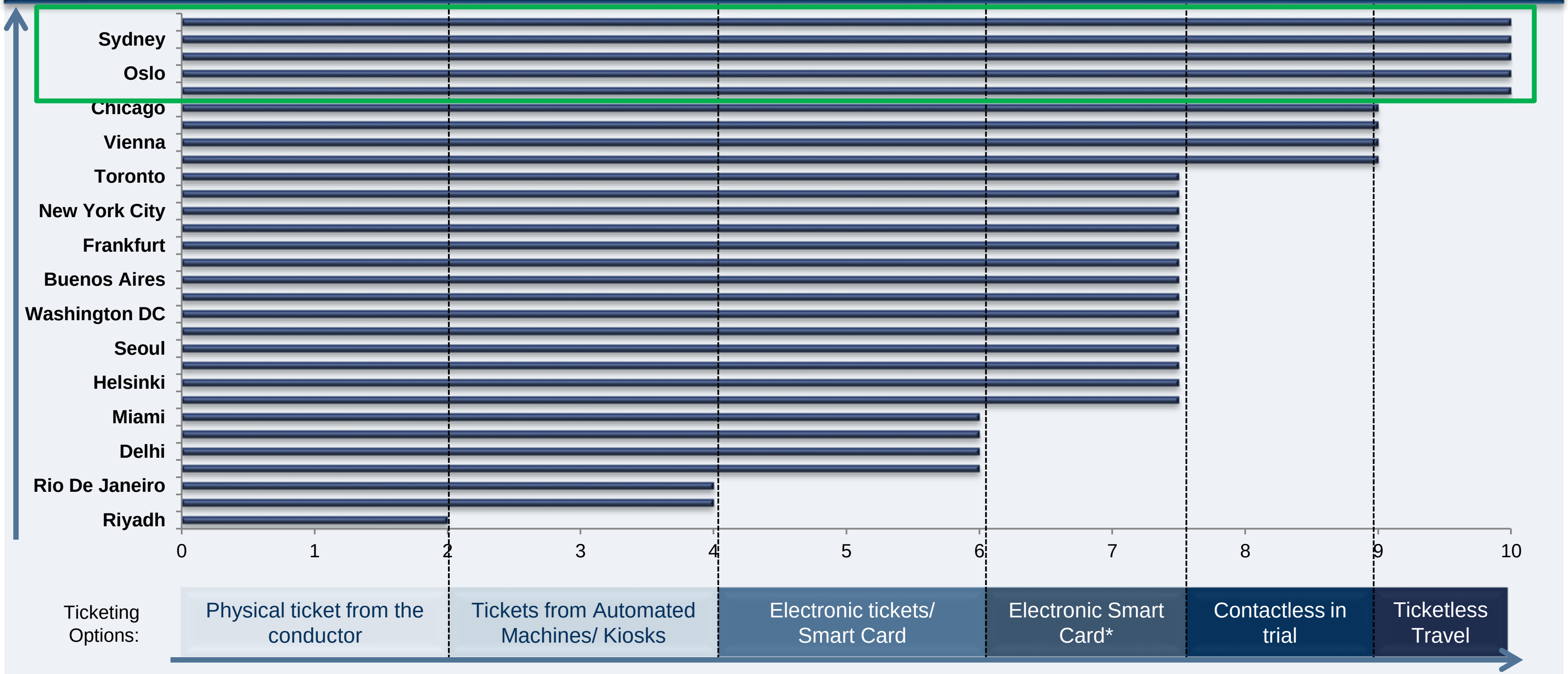
MaaS Operators and Pilots:

Source: Frost and Sullivan

Smart Ticketing Outlook across cities

Integration in Payment systems is crucial to launch mobility as a service- 5 cities globally launched contactless payment systems across the public transit network

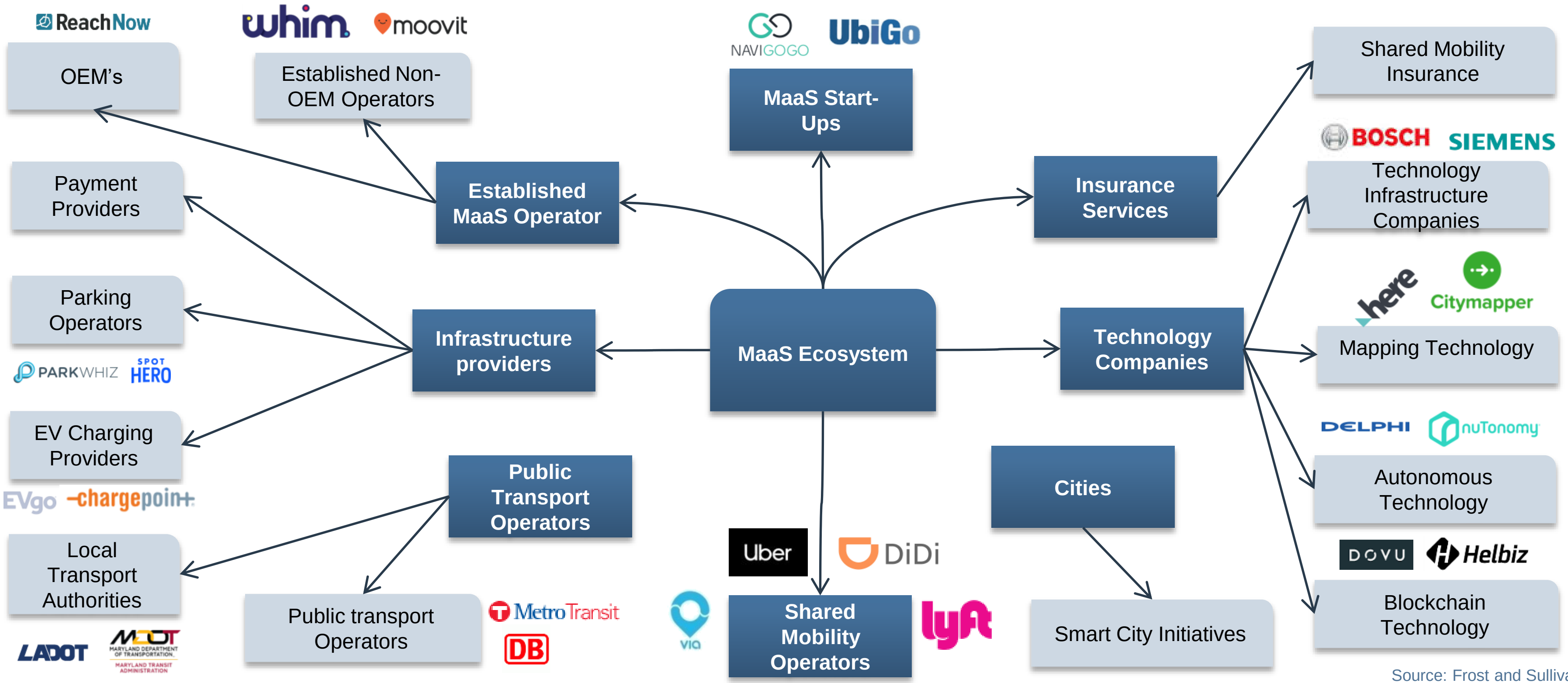
Integrated/ Smart Tickets Outlook, Select Cities



Source: Frost & Sullivan

Evolution of the MaaS Ecosystem

Market is witnessing rise of start-ups in this space which are being driven by various institutions including government bodies, research institutions and universities



Source: Frost and Sullivan

Transformation of Shared Mobility Value Chain

Penetration of electric and autonomous vehicles and growing need for smart data services will disrupt value chain segments such as e-commerce, technology and charging infrastructure.

Traditional Automotive Value Chain

- **Manufacturing and Sales**
- **Component and System Supply**
- **Financial Services**
- **Maintenance and Repairs**
- **Used Cars**

Profit pools will shift to downstream services, likely attracting various mobility players and outsiders

Potential From Shared Mobility Downstream Services in the Future

Fleet Providers	Technology Providers	Maintenance Repair & Cleaning	Roadside Assistance	Insurance Providers	Fuel Providers	Parking Providers
\$50 bn	**\$2 bn**	**\$22 bn**	**\$0.3 bn**	**\$18 bn**	**\$4 bn**	**\$0.3 bn**

Overall Revenue Potential of Over **\$98 bn**

New Streams in the Value Chain

- Data Service Providers
- Charging Providers
- Advertising
- E-Commerce
- Vehicle Design Services

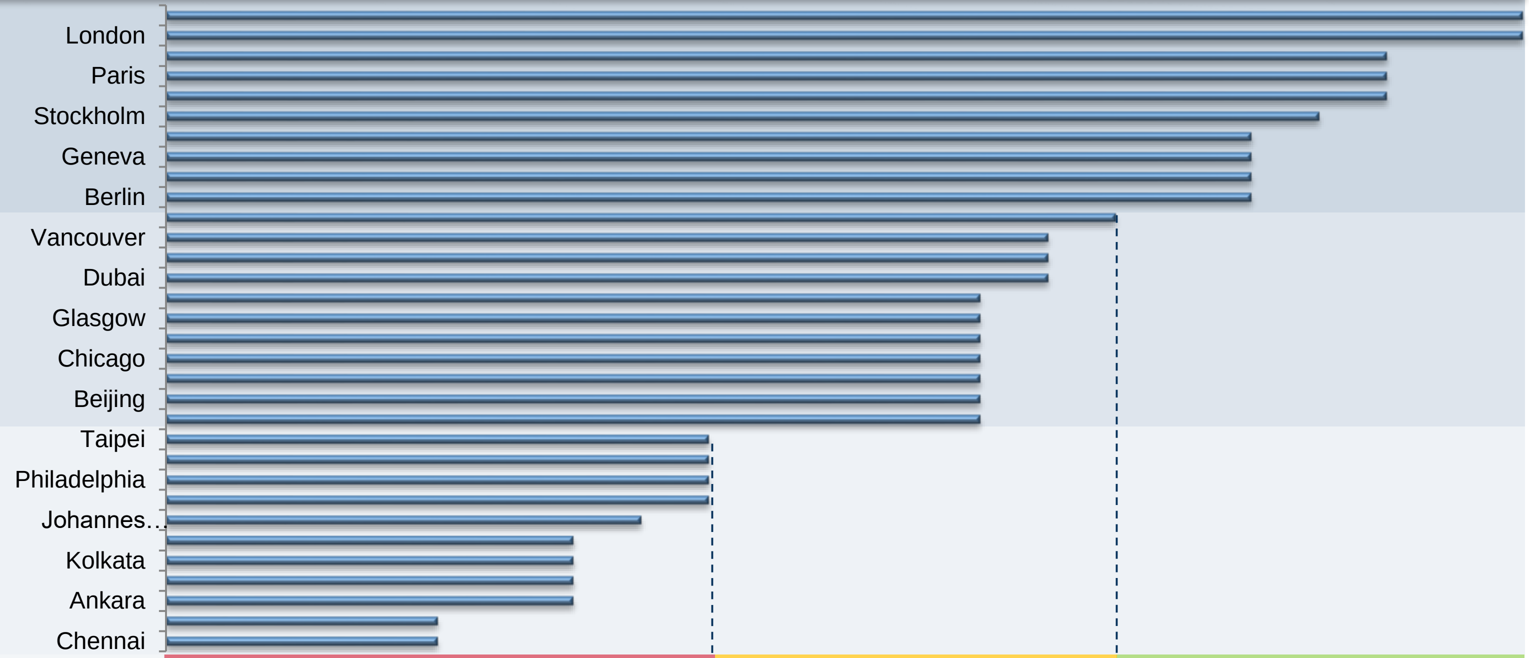
Revenue Potential expected to increase by over **50%**

Source: Frost and Sullivan

Mobility Vision

While more than 20 cities globally have defined a future vision for mobility, majority of these are part of the European region having a strong focus with well-defined frameworks for future mobility.

Mobility Vision

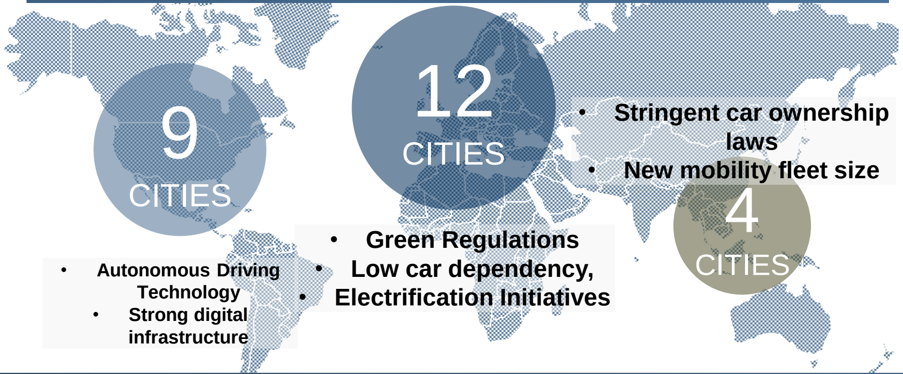


Inhibitors / Accelerators	Challenged by lack of clarity and endless political bureaucracy.	Innovative finance solutions and number of public-private partnership	High level of commitment to ITS with clearly articulated vision, roadmap and technology policies in place

Frost & Sullivan ranks 100 global smart cities for Intelligent Mobility

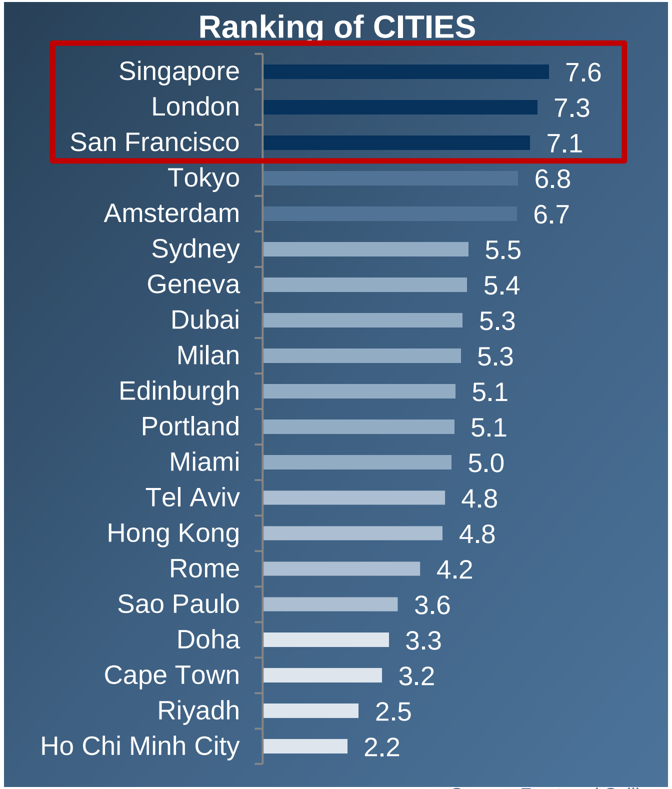
TOP 25 CITIES

SMART MOBILITY CITY INDEX



Factors Contributing To The Calculation Of the Index

New Mobility	Autonomous Technology	Sustainability	Logistics	Digitization	'Smart' Outlook
25%	20%	25%	10%	10%	10%



Source: Frost and Sullivan

Top 5 Predictions for the Future

New Mobility Solutions market will double in size by 2025 1

10% of new vehicle sales globally will be automated (L3 & L4) by 2030 2

50% of Cities will have advance digital capabilities by 2030 3

15% of vehicle fleets will be electric or plug-in hybrid by 2030 4

Mobility as a Service platforms will be available in 30 cities by 2025 5

Source: Frost and Sullivan

Q&A

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