PTOLEMUS
Consulting Group

GLOBAL MOBILITY ROADBOOK

2019
EDITION

FREE
ABSTRACT

The first holistic analysis
of future mobility
in 168 countries

Guiding the industry from transportation to mobility

The first strategy consulting & research firm entirely focused on augmented mobility & automation

Strategy consulting services

- **Strategy definition**
- **Investment assistance**
- **Procurement strategy**
- **Innovation management**
- **Business development**
- **Project management**

Market research services

- **Off-the-shelf reports**
- **Subscription services**
- **Custom market research**

Fields of expertise

Mobility services	Car pooling Car sharing MAAS	Micro-mobility Ride hailing Roadside assistance	Shared mobility Smart parking Tax refund
Vehicle services & telematics	bCall eCall FMS SVT / SVR	Tracking VRM In-car Wi-Fi Fuel cards	Parking Navigation Speed cameras Traffic information
Usage-based charging	Car As A Service Electronic Toll Collection	Mobility-as-a-Service Road charging	UBI / PAYD Vehicle rental Vehicle leasing
Vehicle data & analytics	AI CAN-bus Crowd-sourcing Data protection	Driving behaviour OBD Predictive analytics	Remote diagnostics xFCD
Vehicle automation	ADAS Autonomous cars	Autonomous trucks	Robo-taxis Shuttles
Enabling technologies	Positioning (GNSS / WiFi / cellular) M2M / connectivity	Smartphones Sensors	Telematics devices V2X

Our clients come from across the mobility ecosystem

Analytics, maps & applications providers

AAA, arity, BMJ Group, CarPay Diem, CCC Information Services Inc., Cognizant, Coyote, Dynamic Map Platform, Google, here Maps for Life, ESRI, Increment P, RMS, LexisNexis, PASCO, sas, sentiance, tdf, TomTom, Towers Watson, TrueMotion, Verisk Analytics, wejo, ZENRIN

Automotive manufacturers & suppliers

AGC, Audi, Bosch, Bridgestone, Continental, Cox Automotive, Daimler, Delphi, Directed, Ford, Harman, Hino, Honda, intel, Isuzu, Mazda, Michelin, Mitsubishi Motors, nauya, Nissan, Pioneer, Qualcomm, QOROS, Renault, Scania, Sierra Wireless, Suzuki, Telit, Toyota

Telematics solution providers

Air, Airbiquity, ARKAN, arvento Mobile Systems, Danlaw, DigiCore, Cambridge Mobile Telematics, drivefactor, drust, Eliocity, FleetComplete, Fleetmatics, LoJack, mobile devices, OCTO, HIMEX, IMS, META SYSTEM, SafeFleet, smobil, SISTEMA, ORION, Quartix, Queclink, Scope Technologies, Tantalum, VIASAT, Watchstone.

Mobile telecom operators

AT&T, SFR, SK telecom, Sprint, Telekom Austria Group, Telefónica, verizon, vodafone

Fleet & fuel, ITS & regulators

abertis, ALD Automotive, ARAL, ARVAL BNP Paribas Group, autostrade, AVIS, Axxès, bp, Brisa, CGI, DKV, Edenred, EFKON, egis, eni, EUROMASTER, ew, European Commission, FLEETCOR, kapsch, OMV, mouchel, Nomad Digital, NORBIT, Routex, SICK, SOFICO, TELEPASS, THALES, T-Systems, TOLL COLLECT service on the road, VITRONIC machine vision people, wex, zipcar

Device & location suppliers

ANDREW, cnes Centre National d'Études Spatiales, LOCATION SMART, Navizon, NOKIA Connecting People, gmv, HUAWEI, SAMSUNG, ThalesAlenia Space, Telespazio, DEVERSWARE, SYSNAV Navigation Solutions, TruePosition

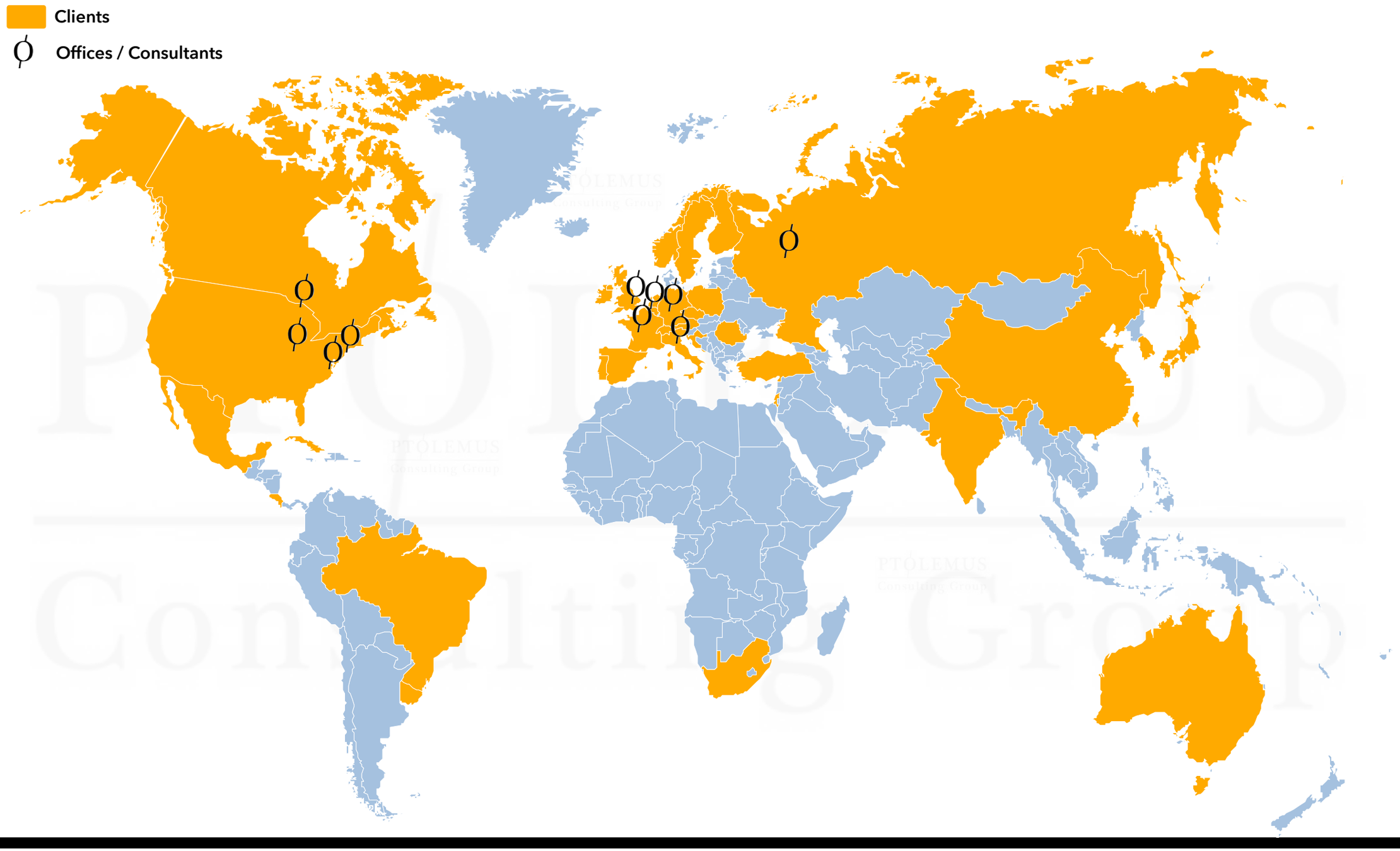
Insurers, aggregators & assistance providers

AAA Insurance, ADMIRAL, Agero, Aioi Nissay Dowa Insurance, MS&AD Insurance Group, Allianz Global Assistance, Allstate You're in good hands., American Family Insurance, AVIVA, AXA, Baloise Insurance, carrot, covea, Crédit Agricole Assurances, Desjardins, europ assistance, FARMERS INSURANCE, FIA, GENERALI, The Hartford, IAG Insurance Australia Group, intact insurance, Inter Mutuelles Assistance, ИНГОССТРАХ Ingosstrakh, HUK, Liberty Mutual, MACIF, Matmut, MENORA Insurance Ltd, MONDIAL ASSISTANCE, Munich RE, SOMPO JAPAN, Nationwide, OUT SURANCE, PROMUTUEL Assurance, RAC, RSA, smile direct, SOCIETE GENERALE, StateFarm, Swiss Re, telesure, TOKIO MARINE, youi, ZURICH

Banks & private equity investors

Amadeus Capital, Amundi Asset Management, BainCapital, Bank of America Merrill Lynch, BARCLAYS, The Baupost Group, Cinven, citigroup, CVC, DISRUPTIVE Capital Finance, Hellman & Friedman, J.P.Morgan, Goldman Sachs, INTEK GROUP, INVESTCORP, HUTTON COLLINS Partners LLP, Leonardo & Co., MONTEZEMOLO & PARTNERS, New Amsterdam Growth Capital LLC, NOMURA, RENOVA GROUP, PAMPLONA Capital Management, SILVERLAKE, TIME For Growth, THOMA BRAVO

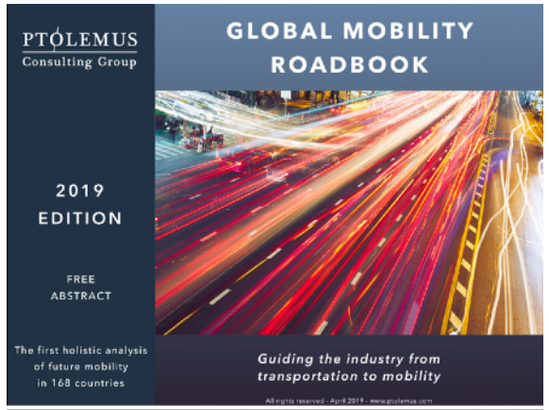
A team of 30 consultants, experts & researchers with 17 nationalities serve our clients worldwide



PTOLEMUS can help your organisation define and achieve its mobility strategy

- **Strategy definition**
  - Future vision in mobility
  - Board coaching
  - Market entry
  - Data analytics strategy
  - Data monetisation strategy
  - Multimodal mobility design and planning
  - Strategy shaping workshops
- **Investment assistance**
  - M&A strategy
  - Commercial due diligence
  - Technology due diligence
  - Feasibility studies
  - Market sizing
  - Business case development
  - Cost benefit analyses
  - Post-merger integration
- **Innovation strategy**
  - Mobility value proposition
  - Mobility plan design
  - Product definition
  - Go-to-market strategy
- **Innovation delivery**
  - Proof of Concept design & launch
  - Architecture definition
  - Project management
- **Procurement**
  - Sourcing strategy
  - Specifications
  - Supplier selection
  - Assistance to tenders
- **Business development**
  - Partnership strategy definition
  - Assistance to tender response

This study is the first user-centric & holistic assessment to help you define your strategy for the mobility revolution



Your comprehensive roadbook to successfully implement new mobility strategies

- **Over 750 pages**, the report assesses the **combined impact of new mobility on the industry and on modal demand:**
  - Assesses the **underlying driving factors** defining the importance of each trend on mobility
  - Defines the **resulting ecosystem and new, emerging suppliers**
  - **Models** how cities can anticipate and predict the impact of new transportation modes on overall trips
  - Provides a **demand forecast** for 11 different land transport modes and the evolution of their market shares
- The **first holistic analysis of the combined impact of 12 mega-trends on mobility**
  - **Aggregated impact on 16 stakeholder categories and 18 transport modes**
  - For each trend, the report provides driving factors, triggers and inhibitors, value chain, case studies and best practices, **strategic guidelines** to leveraging them
  - Includes **over 20 case studies of key stakeholder products and strategies**
- **An analysis of the MaaS ecosystem**:
  - The MaaS value chain and its different stakeholders
  - The **first ranking of the top 6 mobility platform supplier**s globally
- **Best practices for cities:**
  - **8 case studies** of advanced cities reducing congestion and a summary of best practices
  - **A city model predicting the impact of automation and on-demand and shared mobility,** using London as an example
- **The investor's case**
  - An analysis of key investment trends in mobility
  - Profiles of 600 mobility start-ups / scale-ups
- **2018-2030 global mobility demand forecast in 18 regions (or 168 countries)**
  - A bottom-up assessment of the evolution of mobility markets and their effect on demand
  - Based on the quantified assessment of 12 mega-trends
  - A true user-centric, multi-discipline research
  - Detailed methodology and Excel outputs
  - **11 transport modes analysed**
  - Global volumes in passenger km
  - AVs and EVs volume projections

This report is part of the world's most comprehensive mobility research series

GLOBAL MOBILITY ROADBOOK

Mobility trends

- The combined impact of 12 mega-trends on:
  - 16 stakeholder categories
  - 18 road transport modes, from the private passenger car to the kick-scooter
  - Over 20 company case studies

Mobility suppliers

- Detailed analysis of the MaaS ecosystem
- Appraisal of 17 top technology providers to the mobility operators
- Ranking of the top 6 suppliers

Mobility investment

- Analysis of key investments in mobility in 5 categories
- List of 600 start-ups and scale-ups active in the mobility market

Urban mobility

- 8 case studies and best practices for reducing congestion
- City mobility model to predict future demand by transport mode

Mobility market forecasts

- 2018-2030 global mobility demand forecast
- For 11 road transport modes
- Across 18 countries
- AVs and EVs volume projections

The report was written by 10 experts including:

Frederic Bruneteau — Managing Director, Brussels

Frederic Bruneteau is the **founder** of PTOLEMUS Consulting Group.

He has accumulated **20 years of experience of the mobility / transport domains** and 15 years of strategic and financial advisory.

Frederic has become **one of the world's foremost experts of connected mobility & automation** and is interviewed on the subject by publications such as the *Financial Times*, the *Wall Street Journal* and *The Economist*.

He has spoken at more than 50 related conferences worldwide.

Frederic directed the global research for our last 4 reports on mobility:

- **Augmented Mobility 2030 Global Study**
- **Mobility Platform Supplier Handbook**
- **Global Mobility Roadbook**
- **Connected Mobility Forecast**

He has helped many organisations define their strategic & innovation plans and implement them including **Abertis**, **Admiral**, AGC, Aioi Nissay Dowa, Allianz, **Axa**, **Baloise**, BP, Bridgestone, Brisa, Coyote System, Danlaw, Egis, ENI, ESRI, Europ Assistance, the European Commission, Generali, **HERE**, Kapsch, Liberty Mutual, Macif, Matmut, Nationwide, Michelin, the Netherlands' Ministry of Transport, Octo Telematics, Pioneer, Qualcomm, Scania, Sentiance, **Société Générale Insurance**, Telit, Thales Alenia Space, TomTom, Toyota, Vodafone and WEX.

Alberto Lodieu — Manager, Paris

Alberto Lodieu has **9 years of experience in strategy and operations consulting.**

He has assisted organisations such as Abertis, AGC Automotive, Allianz, AXA Partners, Citigroup, CNES, the French space agency, CVC Capital Partners, DMP, Europ Assistance, the European Commission, Liberty Mutual, Silver Lake, Société Générale, Telespazio and ZirconTech.

He participated in **over 30 projects** to help organisations identify and implement the set of initiatives needed to achieve or preserve their leadership.

Alberto has managed part of this mobility research project and has led our work to build a global picture and forecast of mobility trends: new players, new vehicle types, new business models, smart city initiatives, etc.

He also contributed to our **Connected Mobility Forecast**, the first global analysis of 14 connected car services.

The report was written by 10 experts including:

Annie Reddaway — Research Analyst, London

Annie Reddaway has **5 years of experience in the connected vehicle industry**, specifically in the areas of **connected car, cybersecurity and mobility services.** She has researched and run various events and webinars on these topics.

She has worked with companies including **car2go, Zipcar, General Motors, Ridecell, Ford, Fontinalis Partners and WirelessCar**

In 2018, Annie was awarded "Best New Mobility Leader, Analyst or Spokesperson" in the Tech Cars Awards from Auto Connected Car News.

For this report, Annie completed the competitive analysis of the suppliers, impacts of trends on players and provided an overall review of the document

PTOLEMUS Consulting Group

Apoorv Swarup — Senior Business Analyst, Paris

Apoorv has 5 years of strategic and operational experience across India and Europe in mobility.

He has **helped organisations such as AvisBudgetGroup, Bharat Petroleum, Michelin, Renault Nissan and the World Bank.**

For **Renault**, he mapped the competitive landscape including product and pricing strategies for EV and connected services.

For this report, Apoorv **led the research on electric vehicles, Big data and AI**.

In addition, he built **our global for BEV and PHEV forecasts until 2030**.

Spardha Taneja — Business Analyst, Brussels

Spardha has more than 2 years of experience in the automative and insurance industry.

Within PTOLEMUS, she has started developing an expertise in Mobility-as-a-Service and the UBI market.

For this report, she **tested an analytical tool that calculates the change in number of trips taken through various existing modes of transport in a city due to the changing landscape of transportation,** especially the impact of MaaS.

We respond to numerous strategic questions

How will the change in mobility behaviour in cities affect the car market?

What type of companies and business models are attracting more investments?

How will the combined key changes impact Public Transport Operators?

What are the best software platforms providing MaaS today?

How will transport demand evolve in my market?

Who will provide the necessary datasets to sustain the MaaS business model?

What will be the share of new transport modes in the number of urban trips?

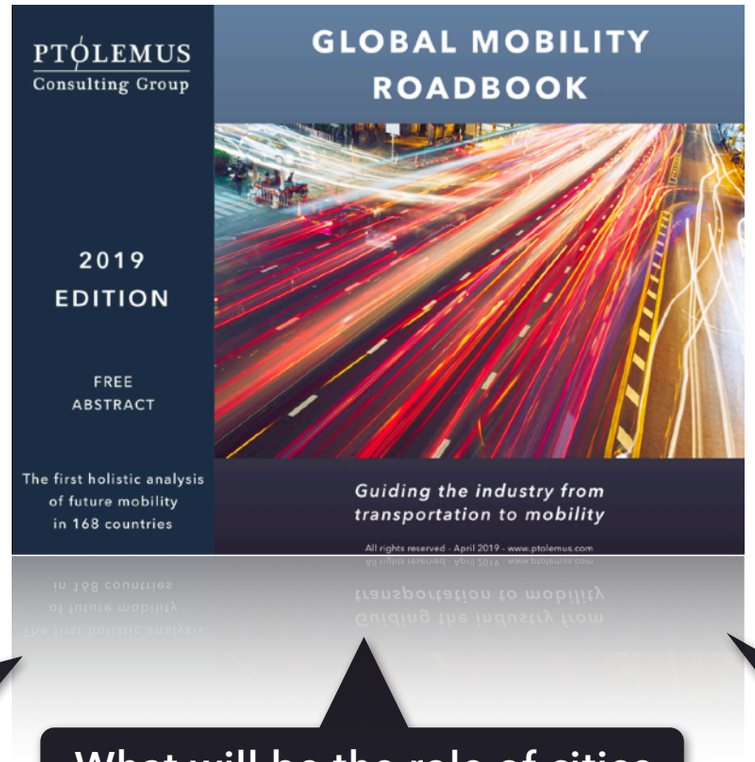
Who in the new value chain will 'own' the end-customer?

Will OEMs retain control over the mobility services platform?

Will AVs reduce or increase the total number of urban trips?

What will be the role of cities and governments in the new mobility value chain?

What are the necessary building blocks to provide a complete mobility platform?



Up to now, future mobility has been predicted in a far too simplistic way

- Unconsciously, we all expect the future of mobility “to be like the past, just bigger”
- We assume that we understand the mega-trends (automation, MaaS, etc.)
- We analyse and forecast the mega-trends separately
- Our models are generally vehicle-centric

Mobility has been predicted as a series of straight, non connected lines

To really understand the future of mobility, our analysis must capture and combine all key trends

- **Mega-trends are not linear**
  - New things arise
  - Others die
- **Trends are like waves**
  - The beginning of the trend is benign
  - The second part is the tsunami
- Trends impact each other and **must be assessed in combination**
- **We must adopt a user-centric view**

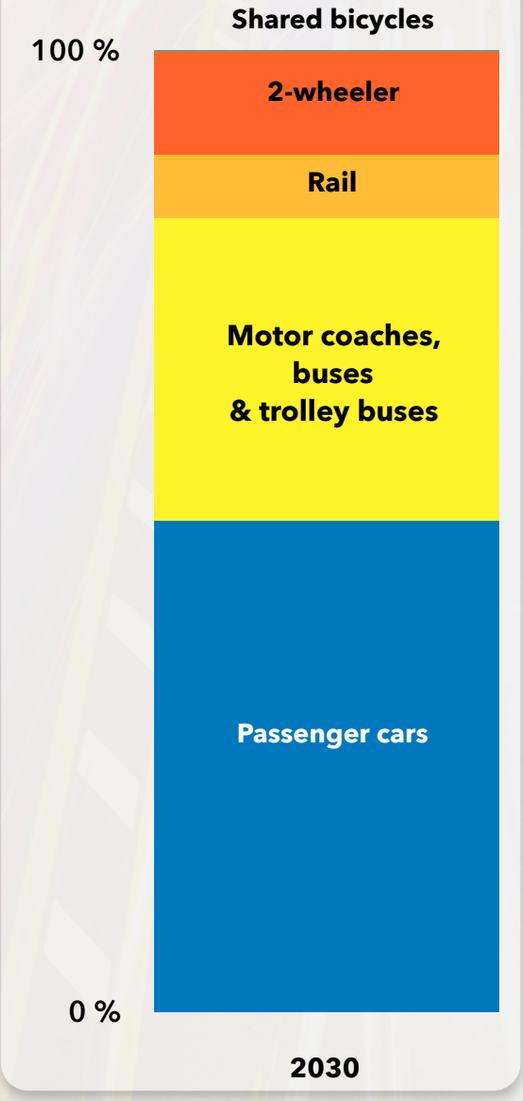
The future of mobility is blurred, messy and cluttered with high noise levels.

And we do not see the sky (or the sun) to orientate ourselves.

The global demand for mobility will grow by 55% by 2030, mostly absorbed by cars! Yet the industry may be unrecognisable

- Global mobility will represent **70 trillion passenger km in 2030, a 55% increase**
  - The growth will be facilitated by **rapid vehicle sophistication brought by developments in automation, electrification and connectivity**
  - As a result, **the number of passenger kilometres driven by cars will further increase by 35% from 2020 to 2030**
- The new **mobility models** enabled by smartphonisation and machine learning will continue to **transform urban mobility**
  - **Car pooling will grow by 22% per annum**
  - **Ride hailing alone will generate 50% of the revenues of car-centric mobility in 2030**
  - **Shared mobility will add 60 billion passenger km** into global traffic, **mainly from cars**
- Urban mobility demand will be **heavily influenced by the deployment of level 4 (L4) autonomous vehicles (AVs), starting in 2021**
  - **15 million L4 AVs** are expected on the road by 2030
- **Automation will lead the ownership model to rapidly switch from owned to shared**
  - Today using a taxi is typically 5 times more expensive than using one's private car
  - By 2030, on average, it will be **20% cheaper to use an autonomous taxi than to use a privately-owned AV**
- Despite fleet electrification growing at 35% annually, only **90 million electric vehicles (EVs) will be on the road by 2030**
- **Alternative and new vehicles will not solve the congestion problem by 2030, traditional modes will still represent most of the growth**
  - Motor **buses and coaches** will become one of the fastest growing transport modes with **25 trillion passenger km** in 2030
  - **Shared electric mopeds** will see the fastest growth of all mobility modes and are expected to represent **8 trillion passenger km** by 2030
- As multiple mobility trends converge towards mobility-as-a-service, **so are the ecosystems enabling them, notably in urban areas**
- Many of the main stakeholders remain the same, however **the balance of influence and decision-making power has yet to be defined**
- **Data access, AI, and a loyal user base are core advantages for companies looking to own the future ecosystem**
- **Smartphones will become the centre piece of the end-to-end user experience for all mobility modes,** they will be the main (two-way) interaction mechanism with mobility users

Modal split of passenger transport



The Global Mobility Roadbook is the first ***holistic*** analysis of future mobility and its impact on demand and the value chain

ANALYSING THE TRENDS SHAPING MOBILITY

ESTIMATING THE IMPACT ON PLAYERS AND THEIR STRATEGY

PLANNING URBAN MOBILITY

INVESTING IN FUTURE MOBILITY

FORECASTING THE GLOBAL MOBILITY MARKET

Source: PTOLEMUS

We identified the 12 mega-trends shaping future mobility

ANALYSING THE TRENDS SHAPING MOBILITY

Connectivity

Smartphonisation

Data & AI

Usage-based charging

On-demand & shared services

Electronic payment

Smarter infrastructure

Mobility as a Service

Automation

Electrification

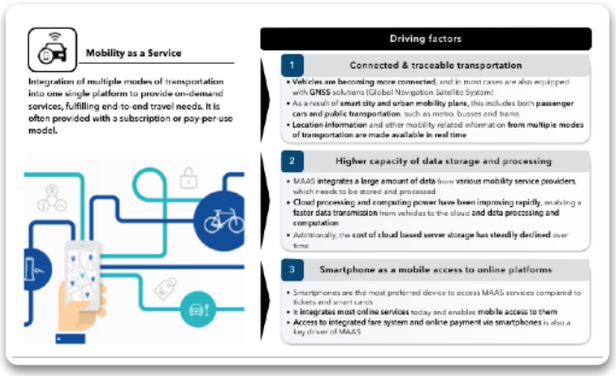
New land vehicles

New air vehicles

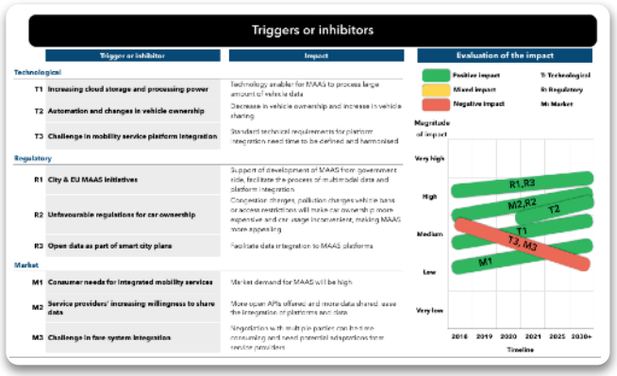
We evaluated their impact on the mobility ecosystem

ANALYSING THE TRENDS SHAPING MOBILITY

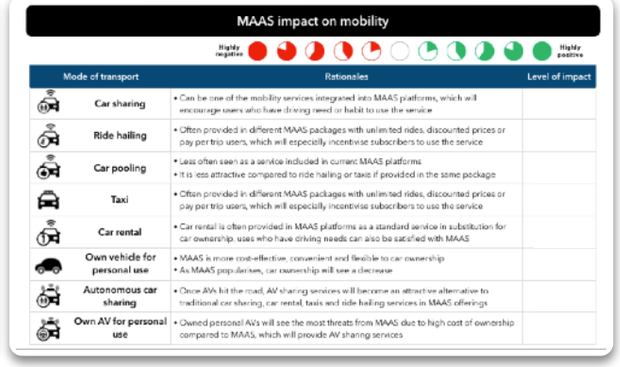
We identify the driving factors



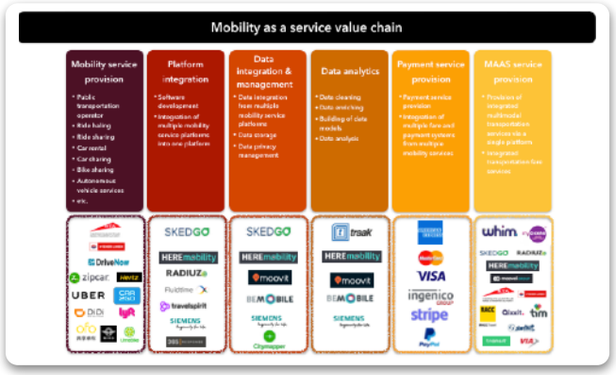
… we assess the main triggers and inhibitors



… we appraise the impact of each trend on each transport mode

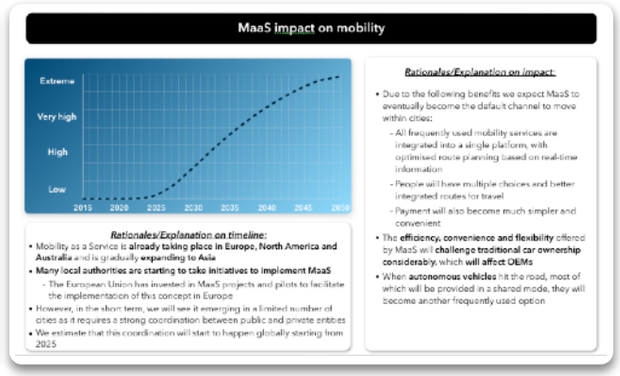


… we analyse the value chain and identify key players driving the trend



… we investigate relevant case studies

… we identify the level of impact that each trend will have in the ecosystem



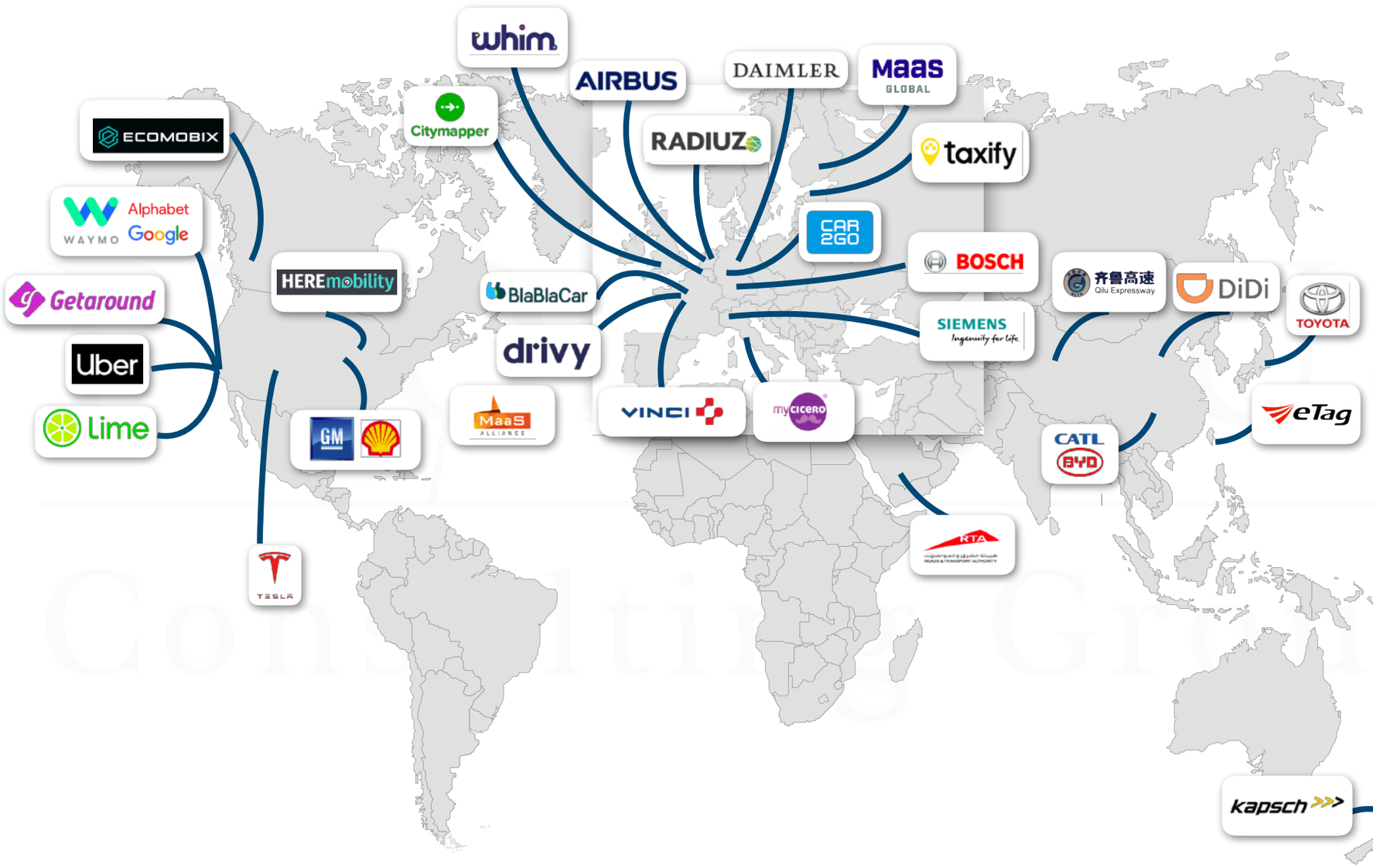
We analysed their impact on 18 transport modes!

ANALYSING THE TRENDS SHAPING MOBILITY

- Car sharing
- Ride hailing
- Car pooling
- Taxi
- Car rental
- Own vehicle for personal use
- Autonomous car sharing /ride hailing
- Own AV for personal use
- Bus/motor coach
- AV buses & shuttles
- Tram & metro
- Train
- Shared 2-wheeler
- Shared bicycle
- New land vehicles
- New air vehicles
- Walking

We investigated 30+ new mobility delivery models in practice

ANALYSING THE TRENDS SHAPING MOBILITY



We assessed their impact on 16 stakeholder categories

ESTIMATING THE IMPACT ON PLAYERS AND THEIR STRATEGY

AUTOMOTIVE OEMs

Audi, Ford, Renault, Daimler, BMW, Tesla, Toyota

CITIES

BXL, Berlin.de, City of London, NYC, Shanghai, City of Los Angeles

ENERGY COMPANIES

BP, Petrobras, eni, Lukoil, PetroChina, Reliance Industries Limited, Total, Shell

FUEL CARD OPERATORS

BP, DKV, OMV, Fleetcor, Total, wex

INSURANCE COMPANIES

Allianz, AXA, Desjardins, Admiral, Generali, Liberty Mutual

IoT TECH. SUPPLIERS

Honeywell, Hitachi Vantara, Konux, Huawei, SAP

LEASING / RENTAL OPERATORS

ALD Automotive, Arval, Sixt, Avis, Hertz

MOBILE OPERATORS

A1, AT&T, orange, SK telecom, Telefónica, verizon, vodafone

MOBILITY PLATFORM PROVIDERS

BeMobile, Bla Bla Car, DiDi, Grab, SKEDGO, Maas Global, Uber

PARKING OPERATORS

INDIGO, iParkit, RingGo, Park'N Fly, QPark

PAYMENT PROVIDERS

VISA, mastercard, PayPal, stripe, UnionPay, PayLane

PUBLIC TRANSPORT OPERATORS

GVB, MTA, sporveien, Transport for London, MIVB STIB

ROAD OPERATORS

abertis, autostrade, Brisa, egis, Transurban, VINCI

ASSISTANCE COMPANIES

AAA, ADAC, Allianz, AXA Assistance, ÖAMTC

TECH GIANTS

amazon, Apple, Baidu, G+, Google, Tencent

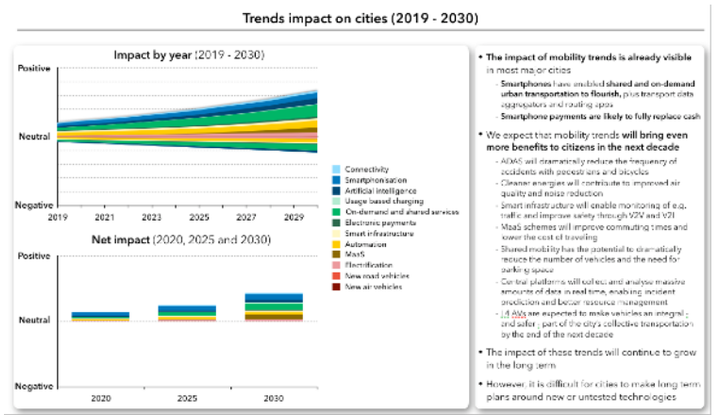
TIER-1 AUTO. SUPPLIERS

AISIN, Bosch, Johnson Controls, Continental, faurecia, ZF

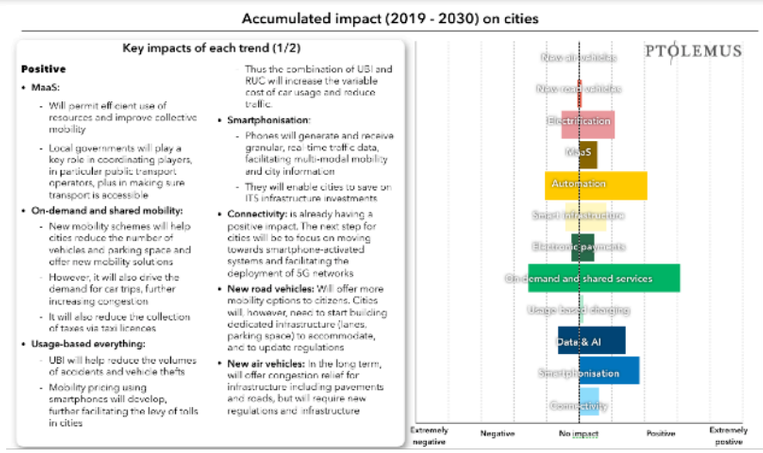
For each stakeholder category, we performed a 4-step analysis

ESTIMATING THE IMPACT ON PLAYERS AND THEIR STRATEGY

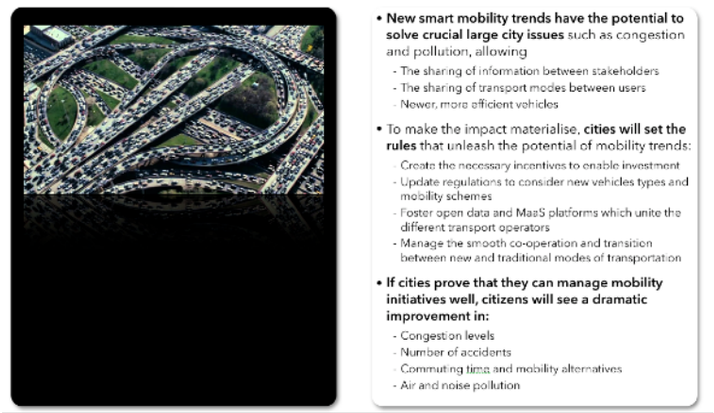
We present the combined impact of all mobility trends on each player between 2019 and 2030



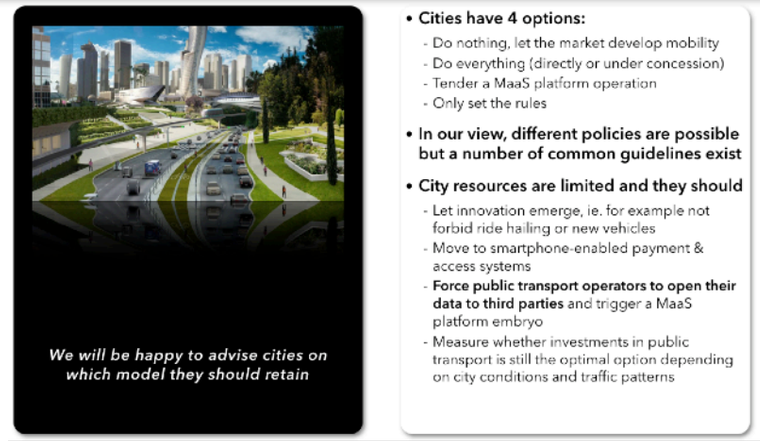
We provide our rationale on why the impact is positive, negative or mixed



We summarise the impact, and explore challenges & opportunities



Finally, we offer guidelines on how to successfully navigate the impact of trends



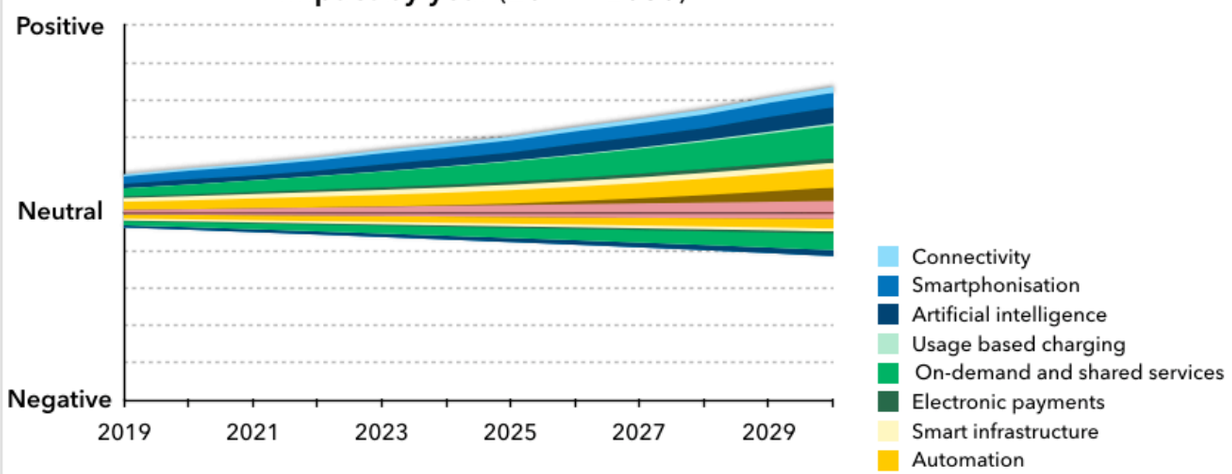
Source: PTOLEMUS

We quantified both positive and negative impacts

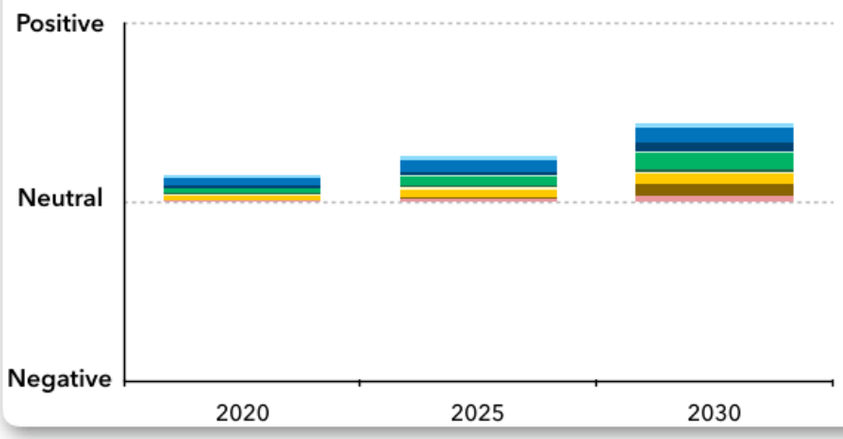
ESTIMATING THE IMPACT ON PLAYERS AND THEIR STRATEGY

Mobility trends' impact on cities (2019 - 2030)

Impact by year (2019 - 2030)



Net impact (2020, 2025 and 2030)



- **The impact of mobility trends is already visible** in most major cities
  - **Smartphones** have enabled **shared and on-demand urban transportation to flourish,** plus transport data aggregators and routing apps
  - **Smartphone payments are likely to fully replace cash**

- We expect that mobility trends will bring even more benefits to citizens in the next decade
  - ADAS will dramatically reduce the frequency of accidents with pedestrians and bicycles
  - Cleaner energies will contribute to improved air quality and noise reduction
  - Smart infrastructure will enable monitoring of e.g. traffic and improve safety through V2V and V2I
  - MaaS schemes will improve commuting times and lower the cost of traveling
  - Shared mobility has the potential to dramatically
  - Central platforms will collect and analyze massive amounts of data in real time, enabling incident prediction and better resource management
  - L4 AVs are expected to make vehicles an integral - and safer - part of the city's collective transportation by the end of the next decade

- The impact of these trends will continue to grow in the long term

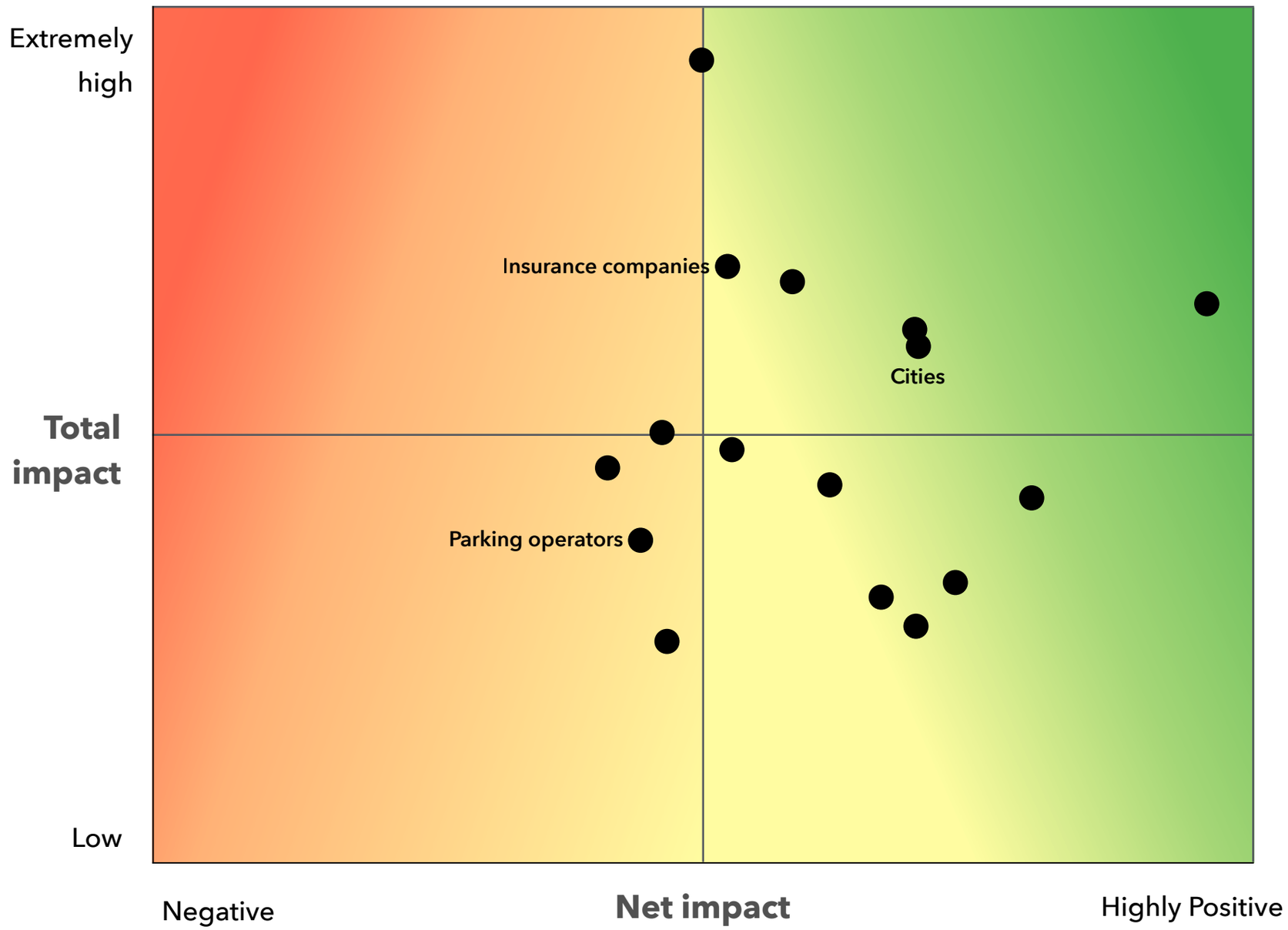
- However, it is difficult for cities to make long term plans around new or untested technologies

To order the study or enquire about our new subscription model, contact mobility@ptolemus.com

Source: PTOLEMUS

We detected which players will benefit the most from trends

ESTIMATING THE IMPACT ON PLAYERS AND THEIR STRATEGY



Source: PTOLEMUS

In this section, we analysed the topics that will permit cities to succeed in designing its future mobility strategy

PLANNING URBAN MOBILITY

Case studies and best practices

We have selected and analysed the top performer cities in congestion management over the last years and determined the best practices to battle congestion

City mobility demand model

The city model forecasts how the number of road passenger trips of a given city will vary among transport modes, especially in the advent of new mobility modes

The emerging MaaS ecosystem

We discuss the emergence of MaaS as well as the ecosystem of stakeholders and building blocks making it happen

Mobility platform suppliers

We also analyse key platform providers and case studies to enable cities and other interested parties to identify potential partners

Suppliers ranking

Finally, we rank key platform suppliers in 2 categories: Transport Service Providers and Mobility Service Providers

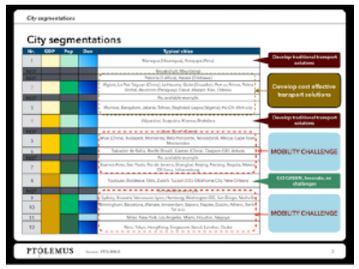
We followed a rigorous analysis not only to identify top performer cities, but also traffic management best practices

PLANNING URBAN MOBILITY

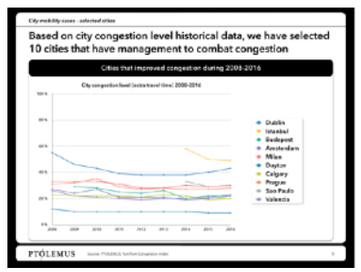
Case studies and best practices

We have selected and analysed the top performer cities in congestion management over the last years and determined the best practices to battle congestion

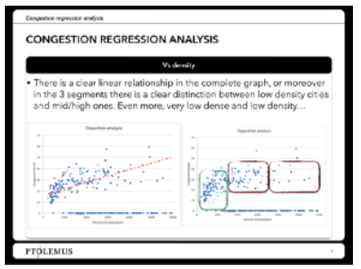
City categorisation based on GDP, population and density



City congestion historical data analysis



City congestion regression analysis



8 selected cities

- Amsterdam, Netherlands
- Budapest, Hungary
- Calgary, Canada
- Dublin, Ireland
- Istanbul, Turkey
- Milan, Italy
- Pittsburgh, US
- Prague, Czech Republic

6 best practices to battle congestion by leveraging mega-trends

1 2 3 4 5 6

We built a model to help cities & urban mobility operators design their strategies leveraging the mobility trends

PLANNING URBAN MOBILITY

City mobility demand model

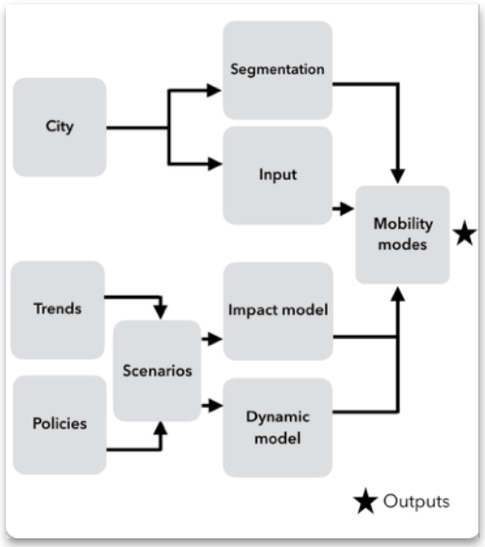
The city model forecasts how the number of road passenger trips of a given city will vary among transport modes, especially in the advent of new mobility modes

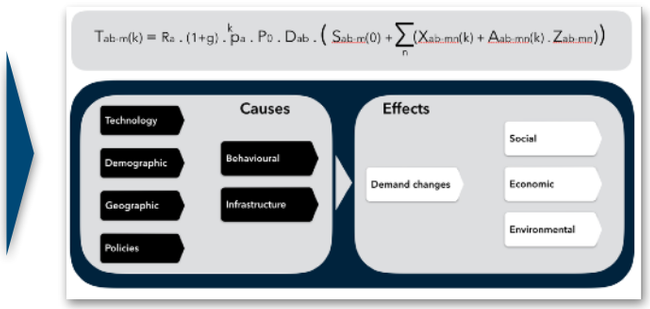
Objectives of the model

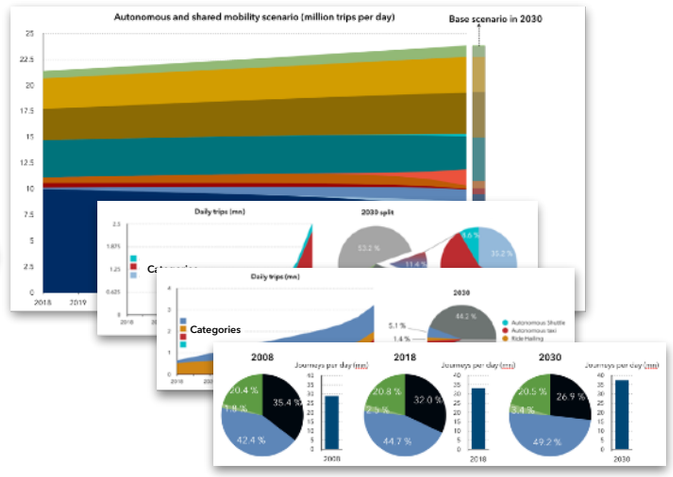
- To **highlight** the changes in the number of trips per mode of urban transport from 2018 to 2030
- To **assess** the dynamics of traditional vs new transportation modes
- To **forecast** the volume of each transportation mode in comparison to others

For whom it is designed

- **Cities** for its policy shaping and investing strategies
- **Public transportation operators** to design their future products and services
- **Investors** to value mobility companies (by understanding the market and potential revenues' structure)
- **Industry and companies** to develop fitting strategies to market structures



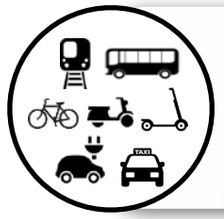




Source: PTOLEMUS

We broke down MaaS to present a diligent analysis of the key building blocks and players in the ecosystem

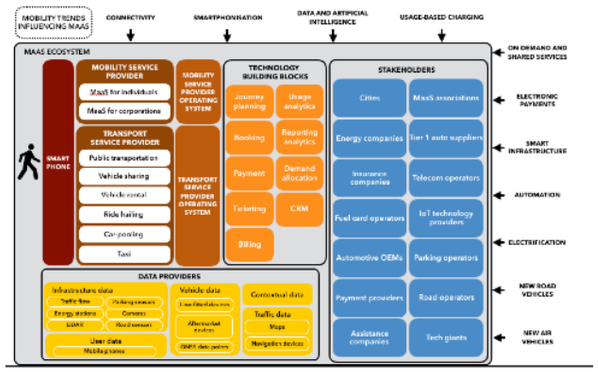
PLANNING URBAN MOBILITY



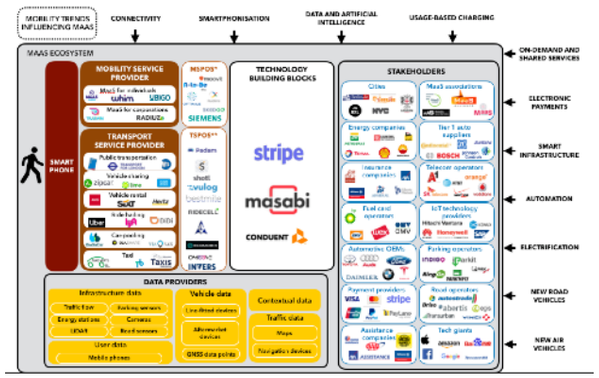
The emerging MaaS ecosystem

We discuss the emergence of MaaS as well as the ecosystem of stakeholders and building blocks making it happen

MAAS ECOSYSTEM

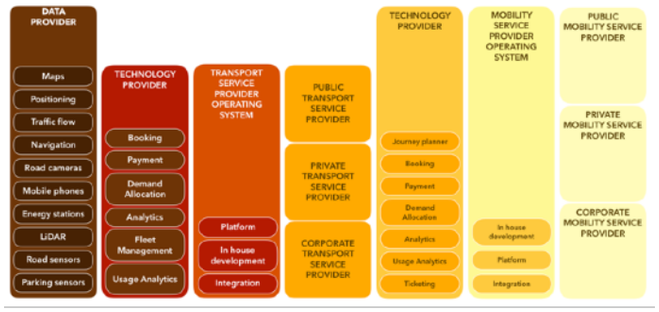


LANDSCAPE



MAAS INTEGRATION LEVELS

MAAS VALUE CHAIN



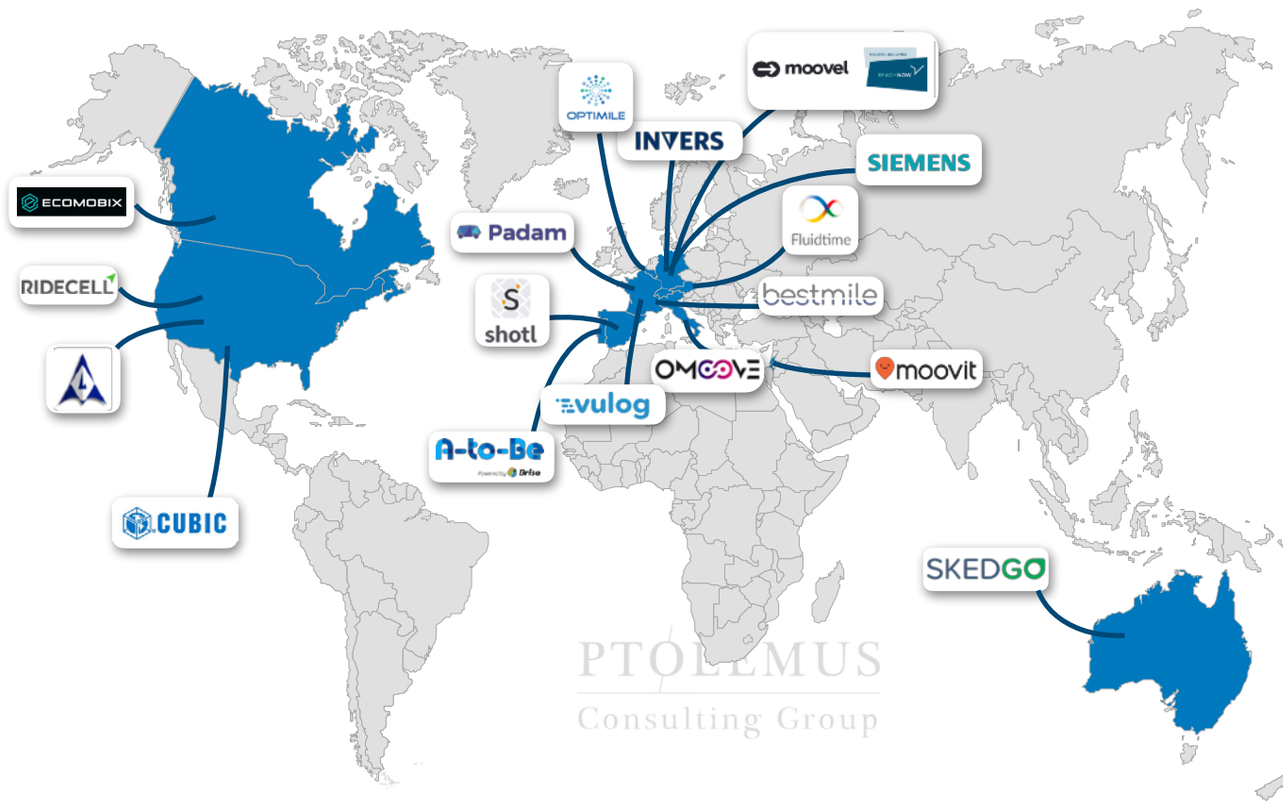
Source: PTOLEMUS

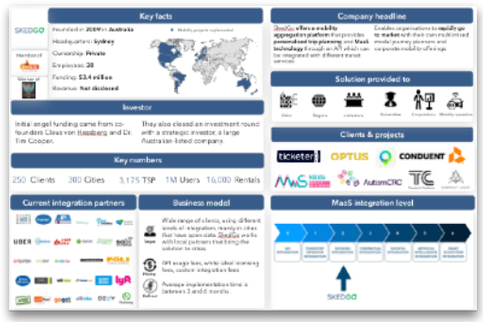
We comprehensively analysed key mobility platform suppliers

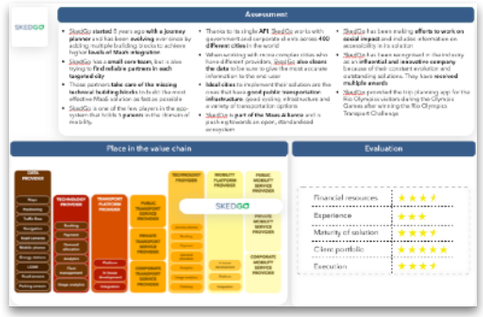
PLANNING URBAN MOBILITY

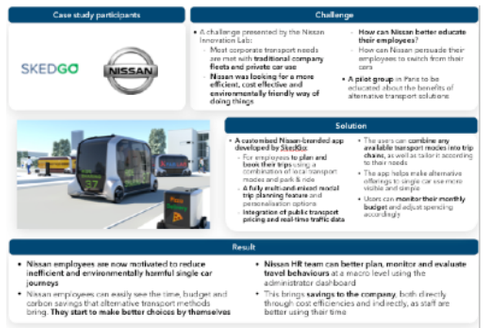
Mobility platform suppliers

We also analyse key platform providers and case studies to enable cities and other interested parties to identify potential partners









Our mobility platform supplier ranking is based on the assessment of 17 companies

PLANNING URBAN MOBILITY

Mobility platform suppliers

Finally, we rank key platform suppliers in 2 categories: Transport Service Providers and Mobility Service Providers

- For an initial list with 20+ of the main mobility platform suppliers, we performed
  - Interviews
  - In-depth market research
  - Detailed analysis
- Based on this analysis, we shortlisted and analysed in further depth 9 TPPs and 8 MPPs
- For each category, we ranked the companies with a clear methodology
- We carefully selected the most relevant metrics and weighted them by their importance

Top 3 **Transport Platform Providers**

Top 3 **Mobility Platform Providers**

Source: PTOLEMUS

We analysed how investments are evolving in the industry and identified the key start-ups/investors for each mobility sector

INVESTING IN FUTURE MOBILITY

Focus areas

- **Categories:**
  - Shared mobility
  - Electric vehicles
  - Autonomous vehicles
  - Last mile transportation
  - Connected vehicles
- **Geographical focus:**
  - North America
  - Europe
  - Asia
- **Amount of funding:**
  - Funding above $1M
- **Time horizon:**
  - From 2015 to 2018

Key insights

How has the funding in each sector evolved by year?

How many transactions have occurred in each sector?

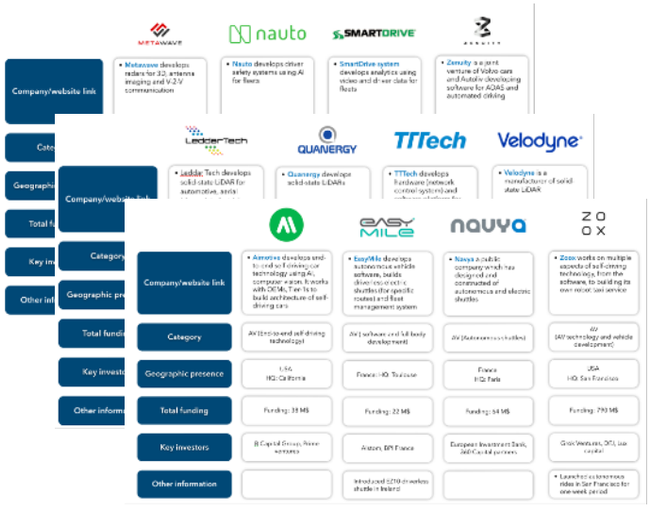
In which steps of the value chain are investments happening?

How did funding evolve in key geographies?

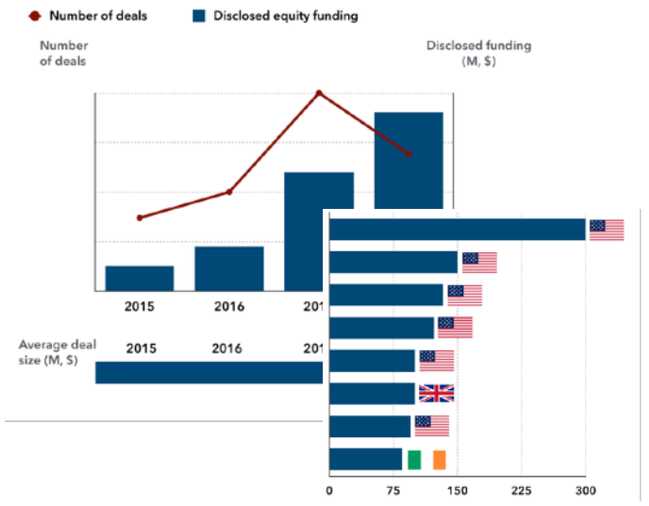
Which are the top start-ups in each sector?

Which technologies will be key areas of investments in next 5 years?

List of 600 start-ups and scale-ups active in the mobility market



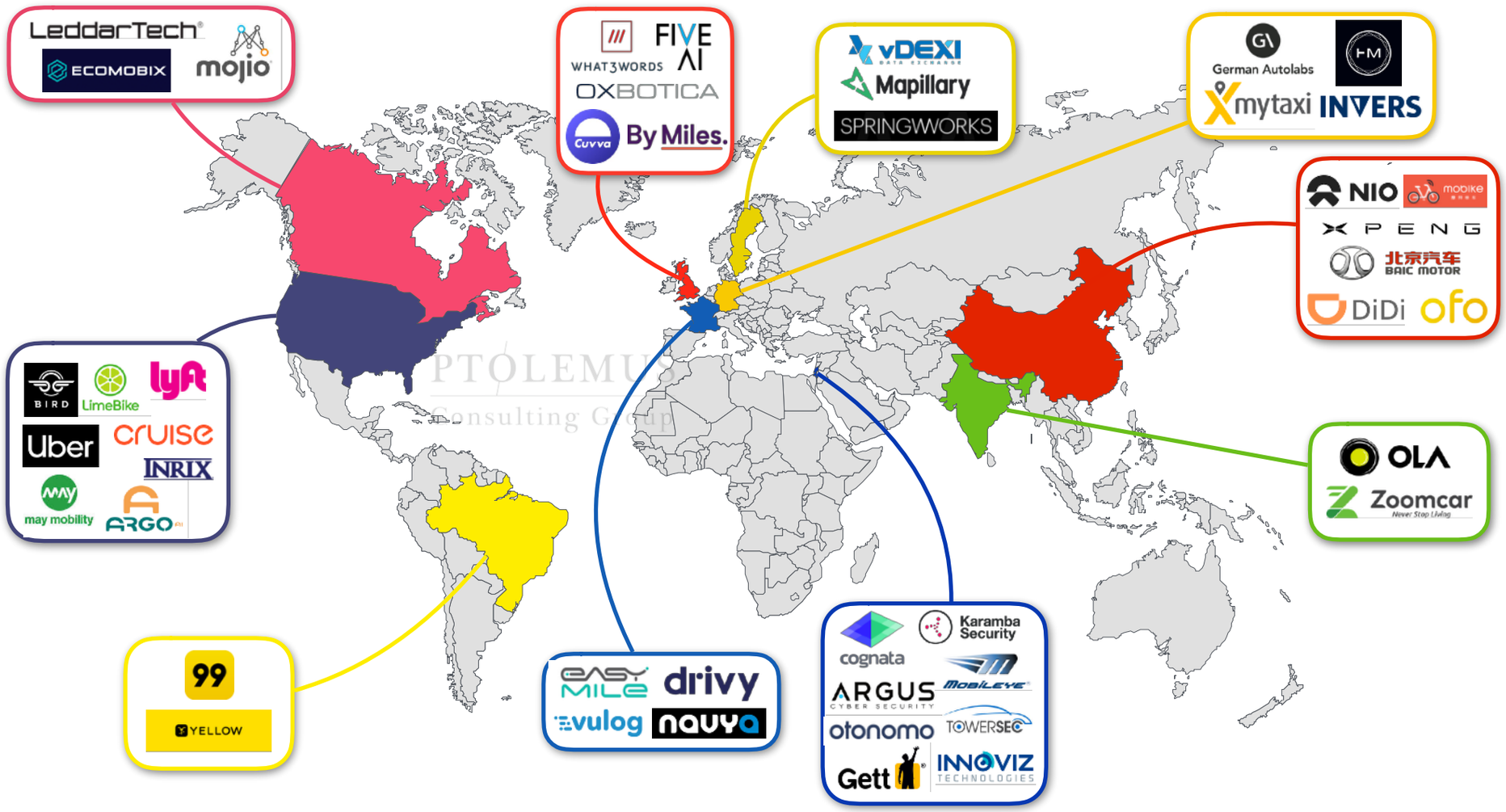
Analysis of key investments in mobility in 5 categories



Source: PTOLEMUS

We also identified the global hubs for mobility investment

INVESTING IN FUTURE MOBILITY



Finally, the study brings the first ever bottom-up forecast of 11 land transport modes in 18 regions until 2030

FORECASTING THE GLOBAL MOBILITY MARKET

Transport modes projected:

- Passenger cars
  - Own vehicles for personal use
  - Car sharing
  - Ride hailing
  - Car pooling
  - Car rental
  - Taxi
- Coaches, buses & trams (incl. sub-categories)
- Rail
- Two-wheelers (incl. sub-categories)
- Bicycles
- New vehicles

Also included:

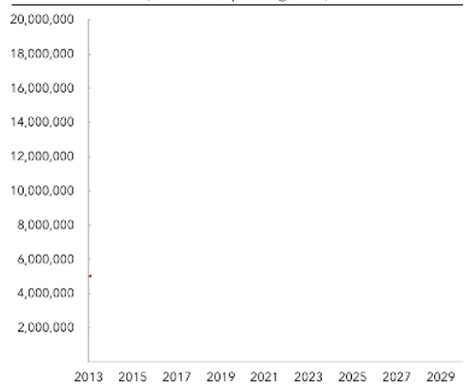
- Global new electric passenger car registrations
- Electric passenger cars in use (5 key markets)
- Autonomous passenger car registrations (L2, L3, L4)
- Autonomous cars in use (L2, L3, L4)

Timescale: Each transport mode is forecast over 3 time horizons: from 2018 until 2020, 2025 and 2030
Unit of volume: million passenger km

Mode	Graph	Units	CAGR 2013 - 2017	CAGR2017 - 2030
Passenger cars		Millions of passenger km	x %	x %
Own vehicles for personal use		*Millions of passenger km*	x %	x %
Car sharing		*Millions of passenger km*		
Ride hailing		*Millions of passenger km*		
Car pooling		*Millions of passenger km*		
Car rental		*Millions of passenger km*		
Taxi		*Millions of passenger km*		
Motor coaches, buses & trolley buses		Millions of passenger km		
Rail		Millions of passenger km		
2-wheeler / shared e-scooter		Millions of passenger km		
Shared bicycles		Millions of passenger km		
New vehicles				

Mode	Graph	Units	CAGR 2013 - 2017	CAGR2017 - 2030
Motor coaches, buses & trolley buses		Millions of passengers km		

Mobility demand for motor coaches, buses & trolley buses
(in million of passenger km)



Validation

Geographic scope

European Union
- France
- Germany
- Italy
- Spain
- UK
- Rest of EU

Rest of Europe

Russia

North America
- USA
- Canada

Latin America

Asia Pacific
- China
- India
- Japan
- Australia
- Rest of APAC

South Africa

Rest of Africa

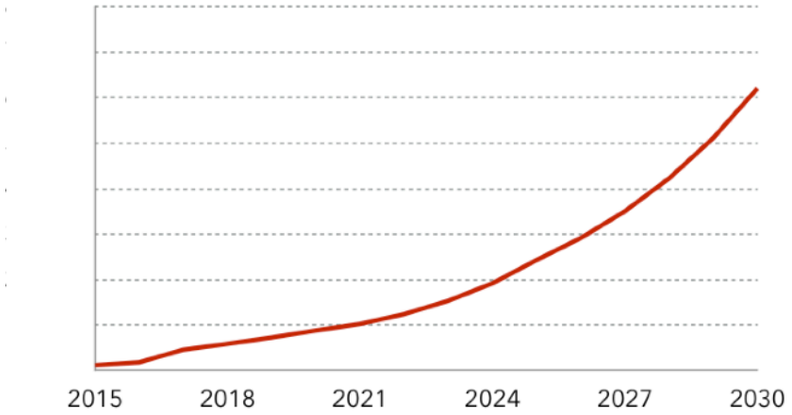
Global

We also estimated revenues generated for key modes and provided our rationals to explain the trend

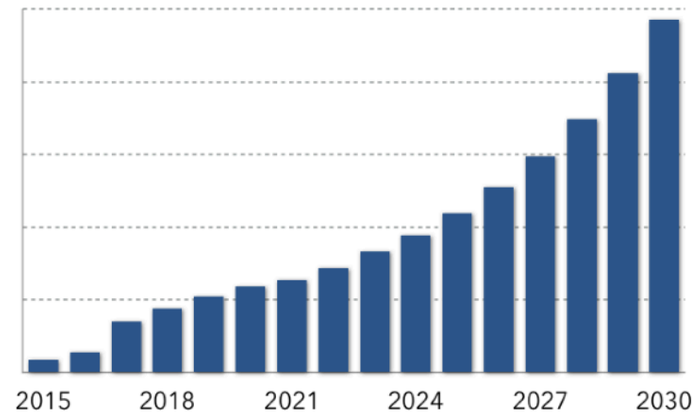
FORECASTING THE GLOBAL MOBILITY MARKET

Mode	Graph	Units	CAGR 2013 - 2017	CAGR2017 - 2030
		Millions of passengers km		

Mobility demand for worldwide
(million passenger-km)



Revenues generated by worldwide
(in million euro)



Rationale

The report covers the activities of over 300 organisations

365 Response	Airbiquity	APCOA Parking	AutoCorp	BikeShare	Breeze bike share	China Mobile	Corrente
3M	Airbus	Apple	Automotive Energy Supply Corporation	Bird	Bridgestone	Cinven	Cowline
99 Taxis	Airbus Ventures	APTA	AutoNation	BIXI	Brisa	CISCO	Cox Automotive
A-to-Be	Aisin	Aral	Autostrade	Blablacar	Brussels Metro	Citibike	Coyote
A1	AISIN	ARC Europe	AVAG Holding	BlaBlaCar	By My Car	Citigroup	Credit Agricole
A123 Systems	ALD Automotive	ARI	Avis	Blockbuster	BYD	Citroen	CSA
AA	Alibaba	Arkan	Avla Networks	Bluegogo	Cabify	Citymapper	Daimler
AAA	Allianz	Arm	AVV	BMI i Ventures	Cabsee	CityMobil2	DAMTC
Abertis	Ally Ventures	Arrend Leasing	AXA	BMJ Group	Car & Away	Citynikes	Danlaw
ACTA	Alphabet	Arval	Baidu	BMW Group	Car Next Door	Cloudbike	Dashee
Activate Capital	Alto	Arval BNP Paribsa Group	Baidu	BMW Group	Car2Go	Clubauto	DATS24
ADAC	Amadeus Capital	AT&T	Bank of America Merrill Lynch	BMW i.	Carplug	Cnes	DB
Adduma car	AMAT	Atlantia	Barclays	BNP Paribas	Carris	Codes Rousseau	De Lijn
Ademe	Amazon	Atlantic Ferries	Base	BNV mobility	CATL	Communauto	Debso
Admiral	American Express	ATM	Beclib	BorgWarner	CCC Information Services	Comovee	Dell
AEG	Amundi	Atzuche	BEM BILE	Bosch	CGI	Conduent	Delphi
Aeroportos de Portugal	Andreessen Horowitz	Audi	Bemobile	Bosch	Chargemaster	Connecteast	Denso
Agero	Andrew	AutismCRC	Berkeley	BP	Chase	Contact Light	Didi Chuxing
Aioi Nissay Dowa Insurance	Animo	Auto Bleue	Bestmile	BPI France	China Grand Auto	Continental	Distruptive

The report covers the activities of over 300 organisations

Divvy	Emel	Eurostat	Ford	Go Urban	Helsinki Business Hub	iGuido Car Sharing	J.P. Morgan
DKV	Emobitaly	Evo Car Share	Free2Move	GoCatch	HERE mobility	Imperial College London	Jaguar
Donkey republic	Emov	EW	Frog Capital	Goget	Hertz	Indigo	Jatco
Dot Transfers	Empark	Facebook	FUJITSU	Goldman Sachs	HHI	Ingenico Group	Jayride
Drive/Reachnow	EMT	Farmacia Silveira	Gabriëls	Gomentum Station	Hino	Ingogo	Johnson Controls
Drivenow	Enel	Faurecia	Galp Energia	GoMore	Hitachi Vantara	Initialized Capital	Johnson Matthey Battery Systems
Drust	Eni	FiA	Garmin	GoNow	Hitch	Inrix	JustPark
DubaiRTA	Enjoy	Fiat - Chrysler	Gazprom	Google	Honda	Instant System	Kapsch
Dynamic Map Platform	Enterprise carshare	First Data	GE	Grab	Honeywell	Intek Group	Keolis
E-Flux	Eon	Fleet Europe	Gemini Investors	Grabhitch	HSBC	Intel	Khosla Ventures
EasyTaxi	Ericsson	Fleetcomplete	Generali	GreenMobility	HSL	Intel Capital	KIA
Ecomobix	Erkon	Fleetcor	Genivi	Greenrock Capital Company	Huawei	Inven Capital	Kodak
Edenred	ESRI	Fleetmatics	Georgia Tech	Group 1 Automotive	Hubway	Invers	Konux
EE	Estradas Portugal	Flex	Ghent University	Groupe Renault	Hutton Collins	Investcorp	Landrover
Egis	Etf partners	Flexigo	GIG Car Share	GSA	Hyundai	Ionity	Launch Mobility
EkoRent	Euromaster	FlitWays	GirACI	GVB	IAG	IOXUS	LeasePlan
Elavon	Europ Assistance	Fluidtime	GLONASS	Harman	Iber	iParkit	Leonardo & Co
Eliocity	EuroPark	Flybrid	GM	Hellman & Friedman	IBM	Isuzu	LG Chem
EMC	European Commission	Föli	GMV	Hello Tomorrow	IDIS	ITS	LG Technology Ventures

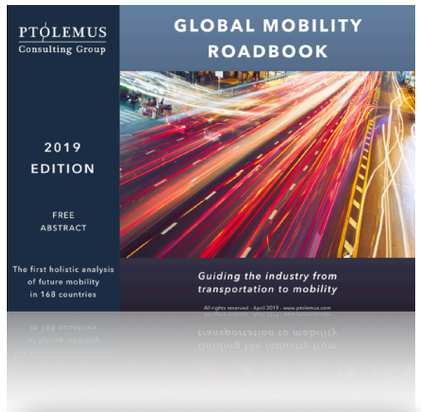
The report covers the activities of over 300 organisations

Liberty Mutial
LimeBike
Location Smart
LoJack
LoRa
Los Angeles
LoveSharing
Lukoil
Lyft
Maas Alliance
Maas Catalonia
MaaS Latam
MaaS Madrid
Maas Scotland
Magna
Marie de Paris
Mastercard
Matmut
Maven
Maxwell
Mazda
Mcvelc
Mercedes Benz
Meta System
Metrobus
Metropolitan Transportation Authority
Metropolitano de Lisboa
Mevo
Michelin
Microlise
Microsoft
Mirror link
Mitsubishi
Miveo
Mobike
Mobileye
Mobility
Mobility+
Mobit
MOL Limo
Mondial Assistance
Montezemolo & Partners
Moovel group
Moovit
Moventis
MTA
Muncipal Parking
Munich RE
mycicero
myTaxi
Navitia.io
Navizon
NESSCAP
NetObjex
NETS
New Amsterdam Growth Capital LLC
New York City
Newland
Nextbike
NGP Capital
Nissan
NMBS
Nokia
Nomura
NTT
nuTomy
Nvidia
NYC OpenData
Octo
Ofo
Ola
Olashare
Omoove
OMV
Onstar
Opel
Optimile
Optimum
OPTUS
Oracle
Orange
Orion
Orleans Metropole
Ouicar
Outsurance
PACA Investissement
Padam
Palm Monorail
Pamplomoma
Panasonic
Park'n Fly
Parkit
ParkNow
Partech
Particle
Pasco
PayLane
PayPal
Pendragon
Penske
Perron
Petrobras
PetroChina
Pioneer
Poppy
PostBus
PPZuche
Preferred Networks
Promutuel
Protean
Proximus
PSA Groupe
PSD2
PTV Group
Qando
Qilu transportation Group
Qixxit
Qoros
Qpark
Qualcomm
Qucit
Quelink
RAC
RACC
Radiuz
RATP
RatP Dev
RCI Bank & Services
ReachNow
Refeel
ReFeel Emobility
Reliance
Remy
Renault-Nissan
Renova Group
Ridecell
RingGo
Road Ventures
Roads & Maritime
Rockwell Automation
RTA
SafeFleet
Samsung
SANEF
SAP
Sas
SBB CFF FFS
Scania
SCOOP@F
Sequoia Capital
Serena
Setec

The report covers the activities of over 300 organisations

SFR	Sobi social bicycles	Sysnav	Toyota	UQM	Volkswagen	Zendrive
Shell	Socar	T Mobile	Toyota Financial Services	Urbano	Volvo	ZF Group
Shopify	Sofico	Telefonica	TPF	US Hybrid	Vulog	Zify
Shotl	Soler i Sauret	Telekom Austria	TPG	USA Bureau of Transport Statistics	Wawa	Zipcar
Sicily by Car	Sonae	Telesure	Traak	UTA	Waymo	Zity
Sick	Sony Innovation Fund	Telit	Transdev	Vaizra	Waze	Zoomcar
Siemens	Sound Ventures	Telstra	Transit	Valeo	Weiner Linien	
Sigfox	Southern Connector	Tencent	TRANSLink	Velhop	Wex	
Silence	SouthWest Transit	Teradata	Transport Canberra	Velib	Whim	
Silence Urban Ecomobility	Sprint	Tesla	Transport for London	Verdeva	Wible	
Sistema	Sproverein	ThalesAlenia Space	Transurban	Verizon	WienMobilLab	
Sixt	Square	theParkingSpot	Travelspirit	VIA	Williams hybrid power	
SK Telecom	STCP	Ticketer	Tropy	Via Verde	Wipro	
Skedgo	STIB	Tim	Turnn	Viasal	worldpay	
Skeleton Technologies	Stripe	Time for Growth	Turo	Viavan	Y Combinator	
SL	Suzuki	TIP (Intermodal port transport)	Uber	Vinci	YouGov	
Smile	Swiftfleet	TomTom	Ubigo	Vintage Investment Partners	youi	
Smobil	Swiftly	Total	UCSF	Visa	Yueqi	
SNCF	Switch	Touring	UnionPay	Vodafone	Yuko	

The roadbook offers a comprehensive market overview and next steps for implementing new mobility



The indisputable analysis of evolving mobility

Global Mobility Roadbook

Contents

- **750-page analysis** of the complex mobility market
- The **impact of 12 core trends on 18 stakeholder types**
- **17 MaaS suppliers assessment** including company strategy, market offering and place in the value chain
- **A quantified city model** to predict the impact of new mobility modes on overall trips
- **Analysis of key investment trends** including profiles of 600+ mobility start-ups and scale-ups
- **30+ case studies** including companies' and cities' strategies
- **The 2018-2030 global mobility demand forecast** mapping mobility demand by 11 mobility modes over 18 countries and regions

Mobility strategy workshop

- The full study presented to your board or strategy team
- Half-day workshop in your offices

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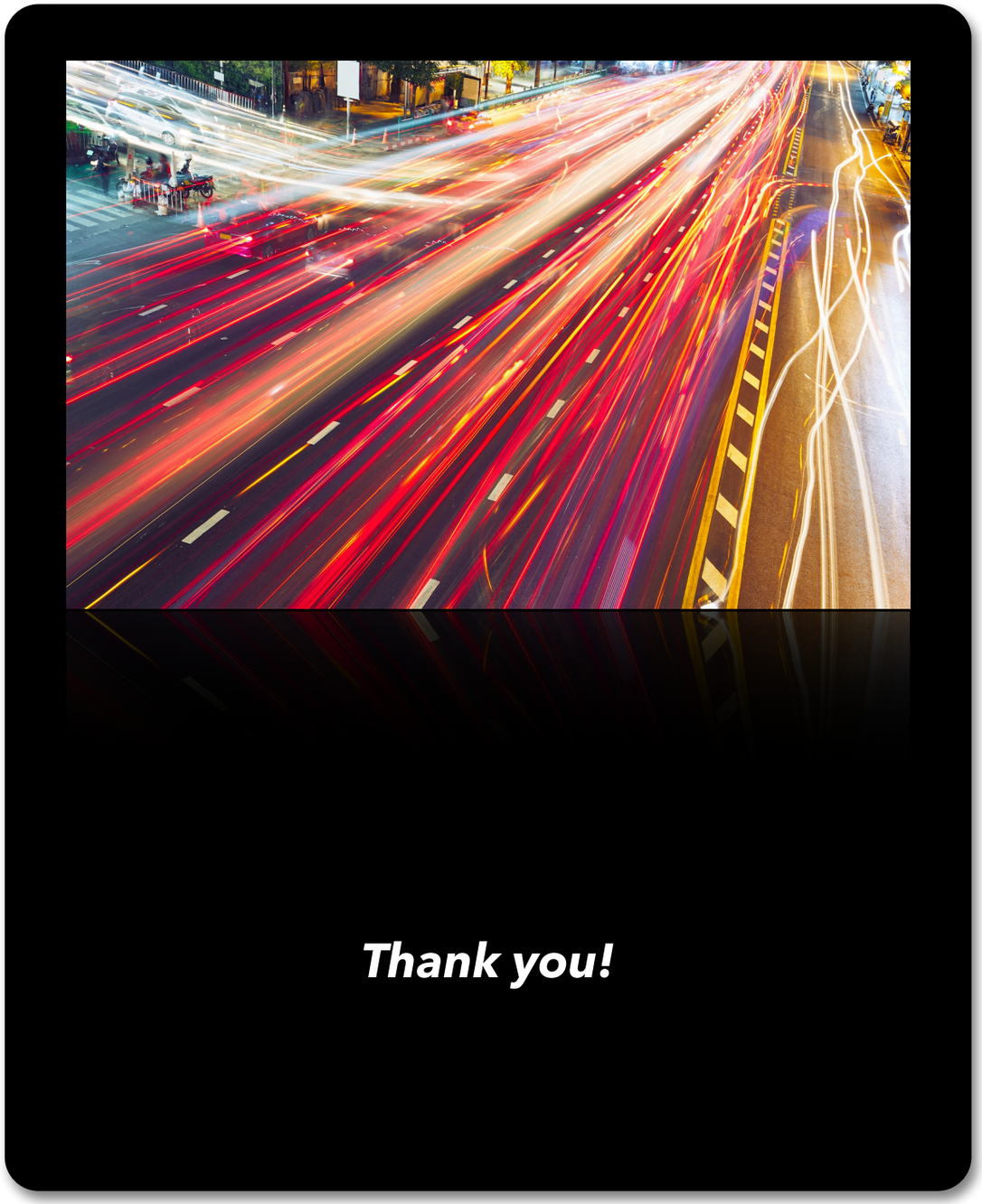
Note: * Conditions apply

As transportation is morphing into mobility, we all must adopt a user-centric, multimodal approach



Thank you!

- **Global transportation will continue to grow**, making urban congestion & pollution even more acute
- The whole mobility industry has been put to task but **mono-mode transport categories and models are outdated**
- **The Global Mobility Roadbook offers the first holistic analysis to redefine mobility strategies**
  - From mono- to multi-modal
  - From supply-driven to user-centric
  - From transportation to mobility-as-a-service
- **It is the tool to make it happen:**
  - A deep analysis of what is about to come
  - 18 modes forecast until 2030

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10 years of experience in shaping future mobility

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Published in April 2019

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