

# Transport and urban smart mobility market trends

August 2023



Technologies  
of Trust



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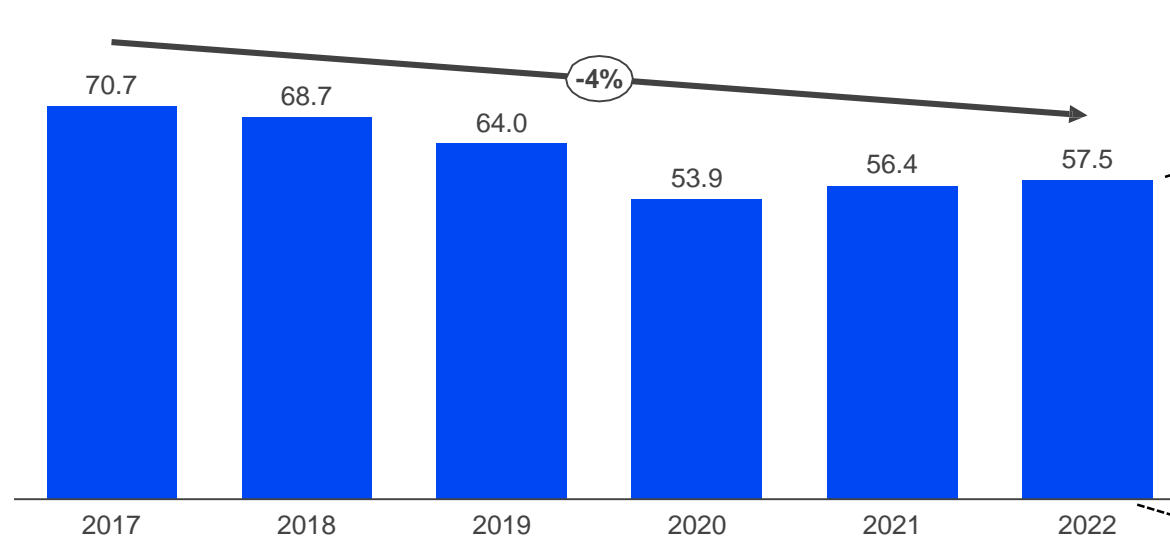


## Global transport and smart mobility market trends

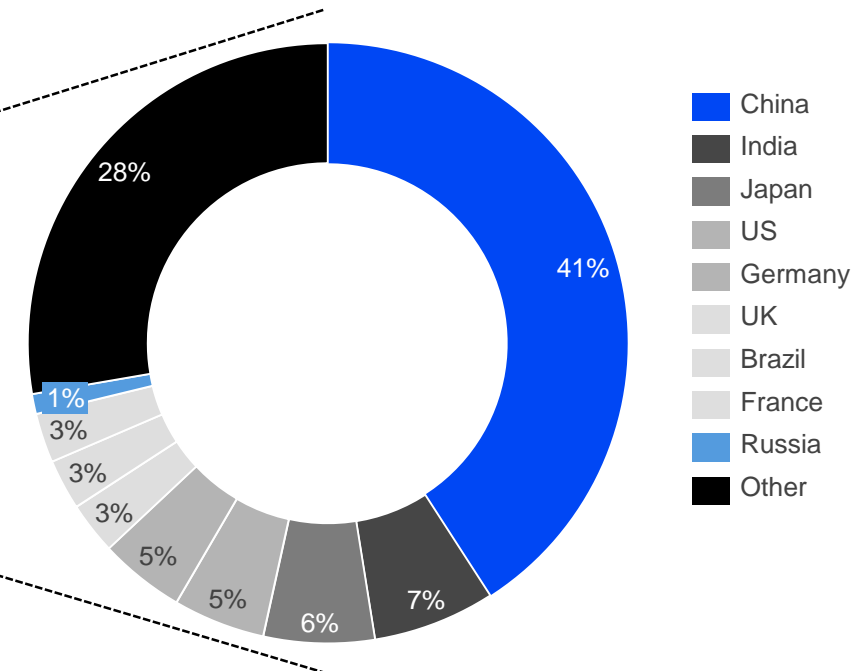


# Global light-vehicle market declined at a CAGR of 4% from 2017 to 2022

Global light-vehicle market in 2017-2022, million cars



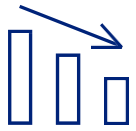
Distribution of the global light-vehicle market by country, 2022





# The decline in the global market is mainly attributed to the transition to a new car composition and alternative types of transport

The decline in the global light-vehicle market is driven by a number of factors:



## COVID-19

The global pandemic disrupted global supply chains and thus affected the light-vehicle market



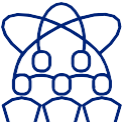
## Transition to a new car composition

OEMs are looking for ways to optimise vehicle composition; accelerated penetration of electric vehicles and end of ICE life; growing role of digitalisation and a car as a software



## ESG agenda

ESG agenda contributes to the trend of transition to environmentally-friendly means of transport (for example, bicycles)



## Sharing economy

In the sharing economy, people make use of public vehicles

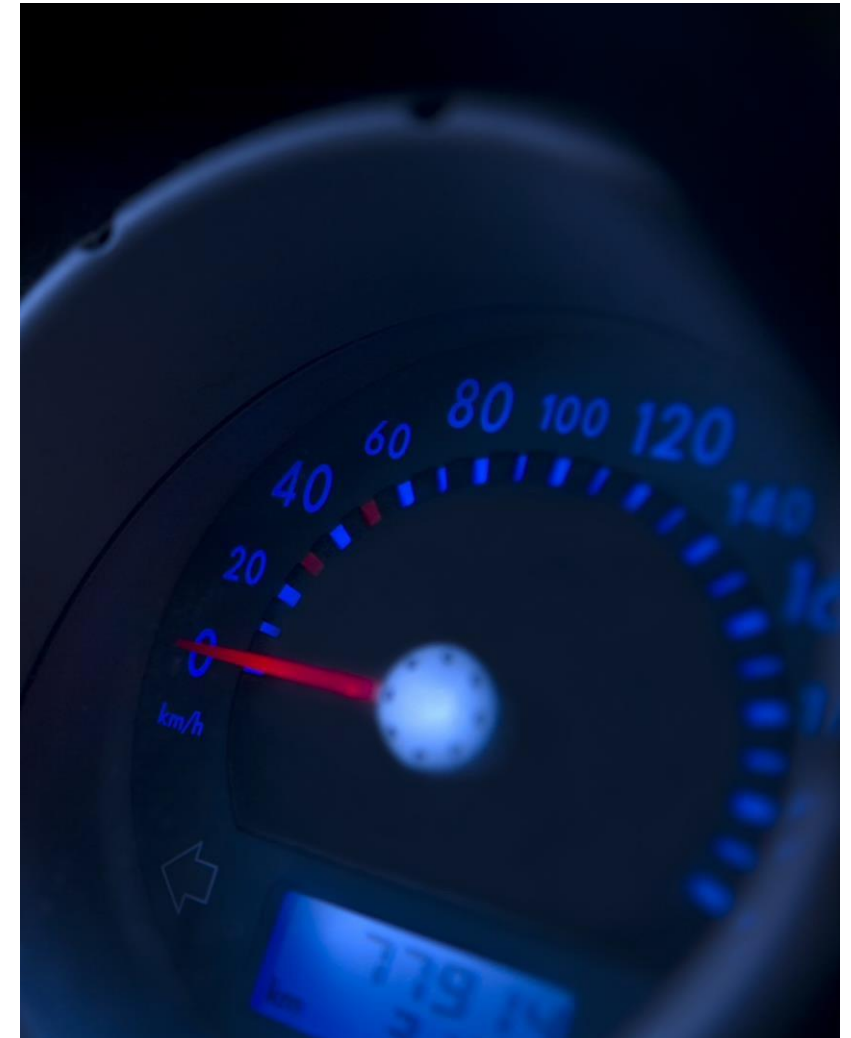


## Public transport development

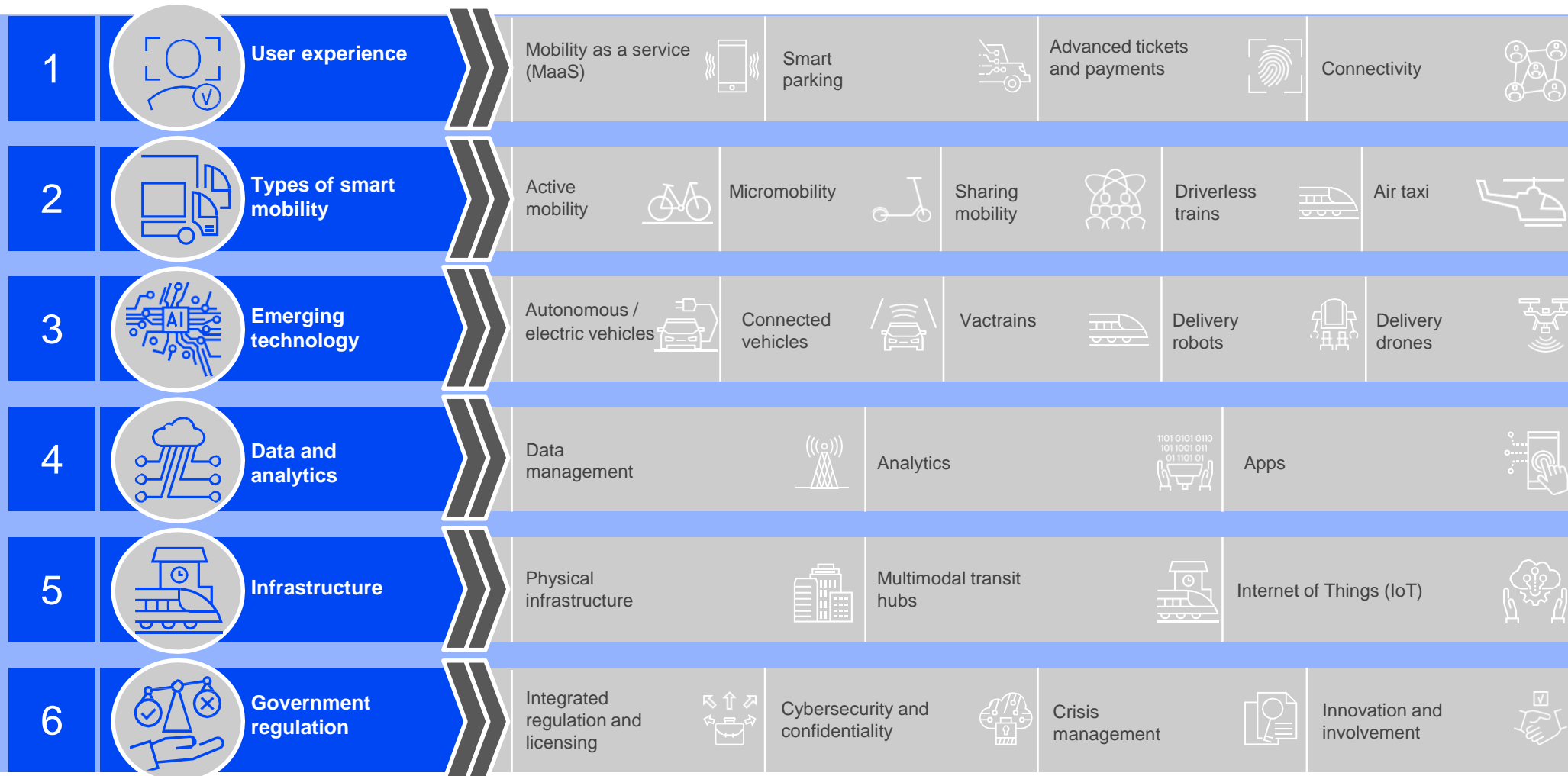
Public transport is no longer just cheap means of transport. Public transport is often the most efficient and comfortable way to travel



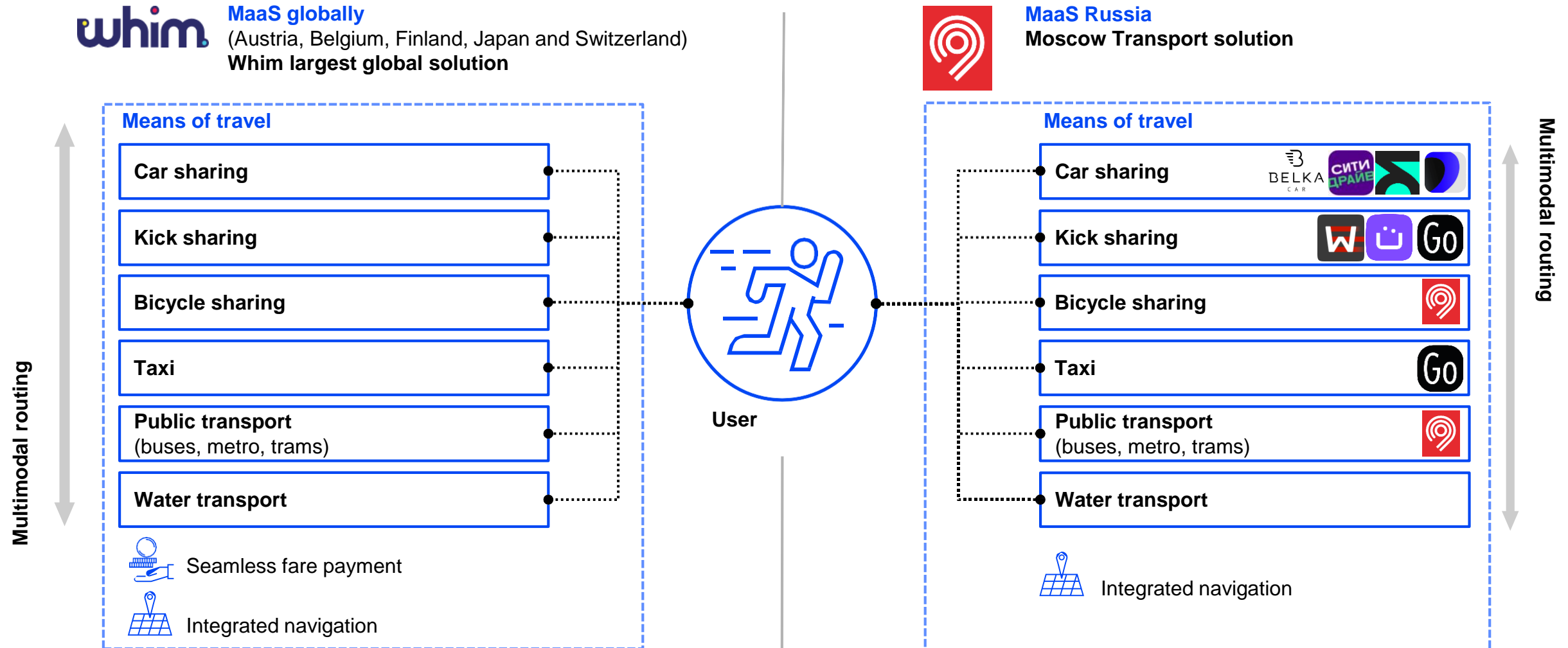
Smart mobility gains relevance



The full-fledged smart mobility ecosystem comprises of 6 basic elements that need to be developed in parallel

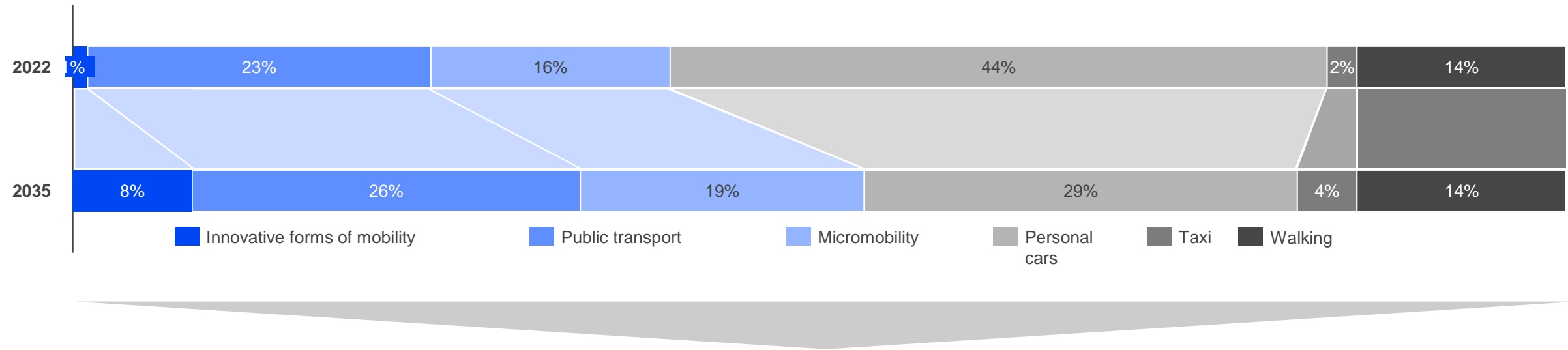


Russian MaaS user solution from the Moscow Transport is designed in line with the global best practices apart from the seamless fare payment system



# Innovative mobility is the fastest growing segment in the global smart mobility market

Global mobility by means of transport, %



## Innovative forms of mobility

Driverless vehicles

Vactrains

Delivery robots

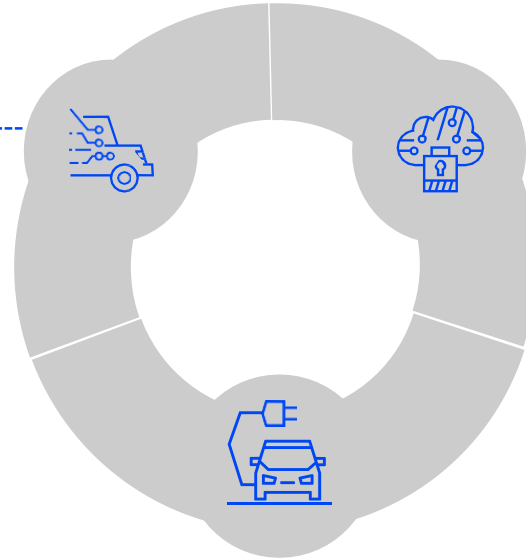
Delivery drones



# Driverless machines, automotive technology and e-vehicles are the main direction in which the Russian smart mobility market evolves

## Driverless machines

- **Yandex** – Self-Driving Car
- **SberAutoTech** – unmanned passenger transportation
- **KAMAZ** – unmanned special vehicles
- **Starline** – RICAR & OSCAR self-driving cars
- **NTI Competence Centre** – navigation system testing for unmanned special vehicles
- **Cognitive Agro Pilot** – a ready-made autonomous driving system for agricultural machinery from the Russian developer



## Technology

- **Vehicle-to-everything (V2X)** – launch of V2X equipment installation in public transport in summer 2022 in St Petersburg. Further development is planned
- **Smart transport system**
- **Advanced Driver Assistance System (ADAS)** – equipment suppliers are present in Russia, including Federal State Unitary Enterprise Central Scientific Research Automobile and Engine Institute (FSUE NAMI) that develops a domestic ADAS system

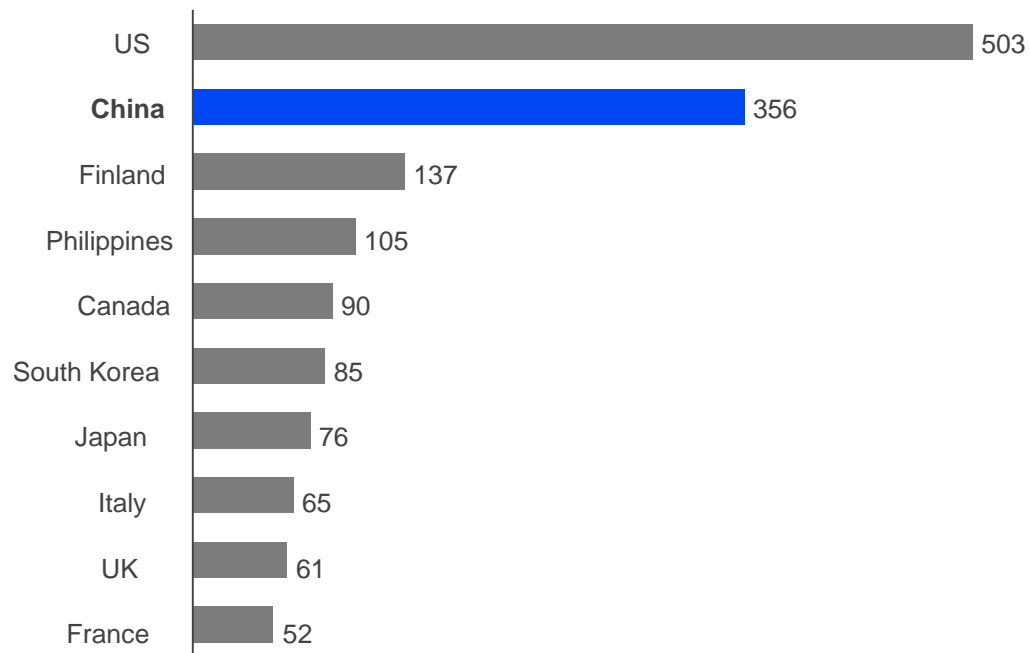
## Electric transport

- **Evolute** – an electric vehicle. On sale starting from October 2022
- **Moskvich electric car** – an electric vehicle. Sale started early in 2023
- **ATOM electric car** – a prototype; commercial version expected by 2025
- **SberAutoTech FLIP** – a prototype of electronic autonomous public transport vehicle

The lifeblood of smart mobility is high-speed Internet. China boasts leadership in Asia by 5G coverage. Local car manufacturers implement enabling technology in their car offering

**The smart mobility system cannot develop without high-speed Internet.** 5G coverage is required to increase the speed of data transmission and processing, operate driverless vehicles, support Vehicle-to-everything (V2X) and Smart Transport System, etc.

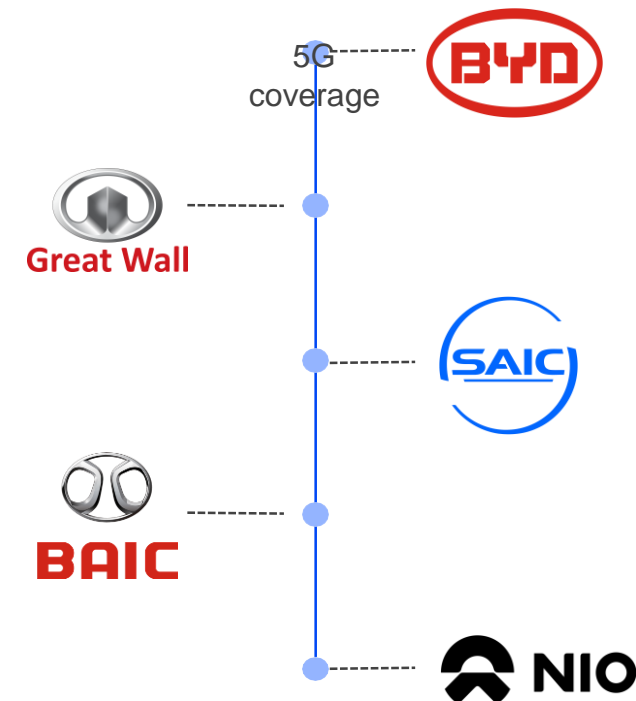
Number of cities by country where 5G is available, 2023\*



\*Including smaller municipalities

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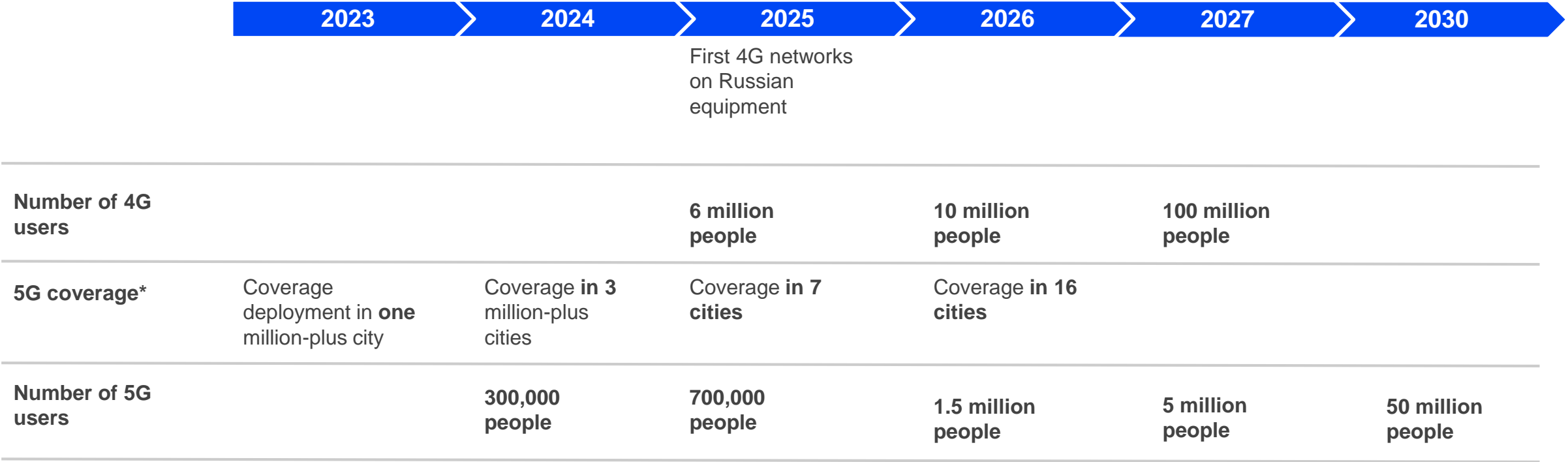
Chinese car manufacturers that have been deploying 5G support in their car offering



Source: Open sources, TeDo analysis

# 5G coverage on a mass scale is expected in Russia by 2030 only...

## Modern and prospective mobile networks. Roadmap\*



The 5G coverage deployment in Russia might be delayed due to problems with import deliveries of equipment and project feasibility issues

\* Under the agreement of intent between the Russian Government, PAO Rostelecom, OOO KMS GROUP and Rostec Corporation for the development of the high-tech initiative – Modern and prospective mobile networks

\*\* Based on domestic equipment



... on the other side, Moscow is the best megacity in the world by the infrastructure maturity

UN-Habitat's City Prosperity Index (CPI) 2022

Infrastructure development

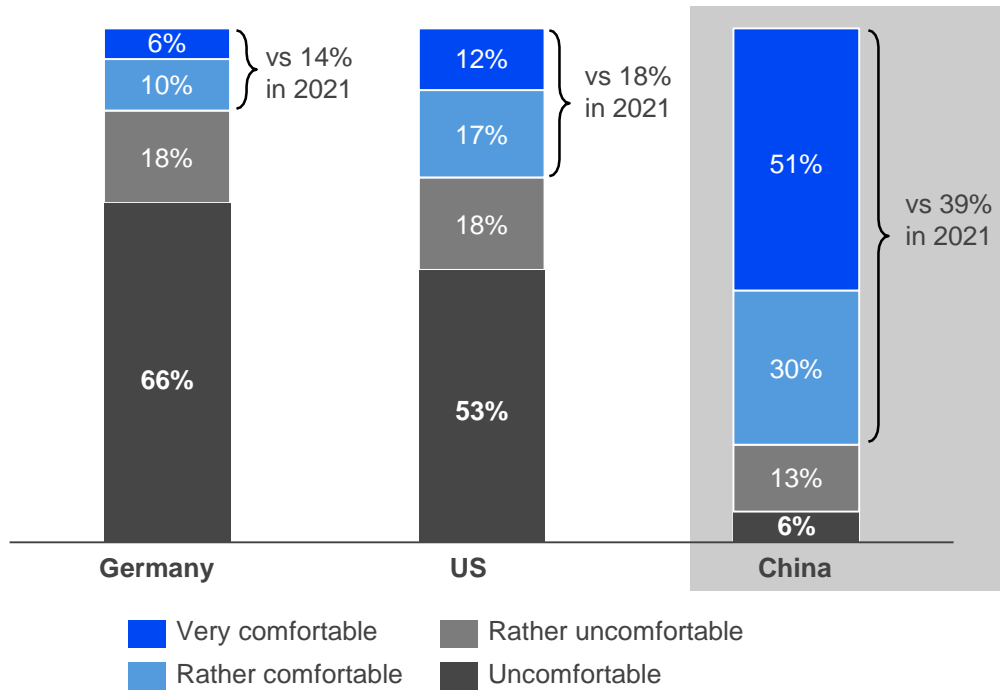
1		Moscow
2		Hong Kong
3		Paris
4		London
5		Madrid



This measures such dimensions as housing infrastructure, urban mobility, social infrastructure, ICT and street connectivity

China is the country most prepared for autonomous vehicles from the perspective of consumer attitudes. The government encourages the driverless transport development

### Consumer attitude towards autonomous driving, 2022



**Question:** How comfortable would you feel using a fully autonomous vehicle?

China's National Development and Reform Commission has issued a joint guide to **promote and develop autonomous vehicle innovations** that sets the following ambitions for 2025:

#### Level of autonomy

Large-scale manufacturing of L3 vehicles and launch of V4 vehicles.\* By 2030, one in 10 vehicles must be completely self-driving.

#### Connectivity

LTE-based Vehicle-to-Everything will be deployed, with some cities and highways connected to the fifth generation V2X (5G-V2X) with high-precision spatial and temporal references.

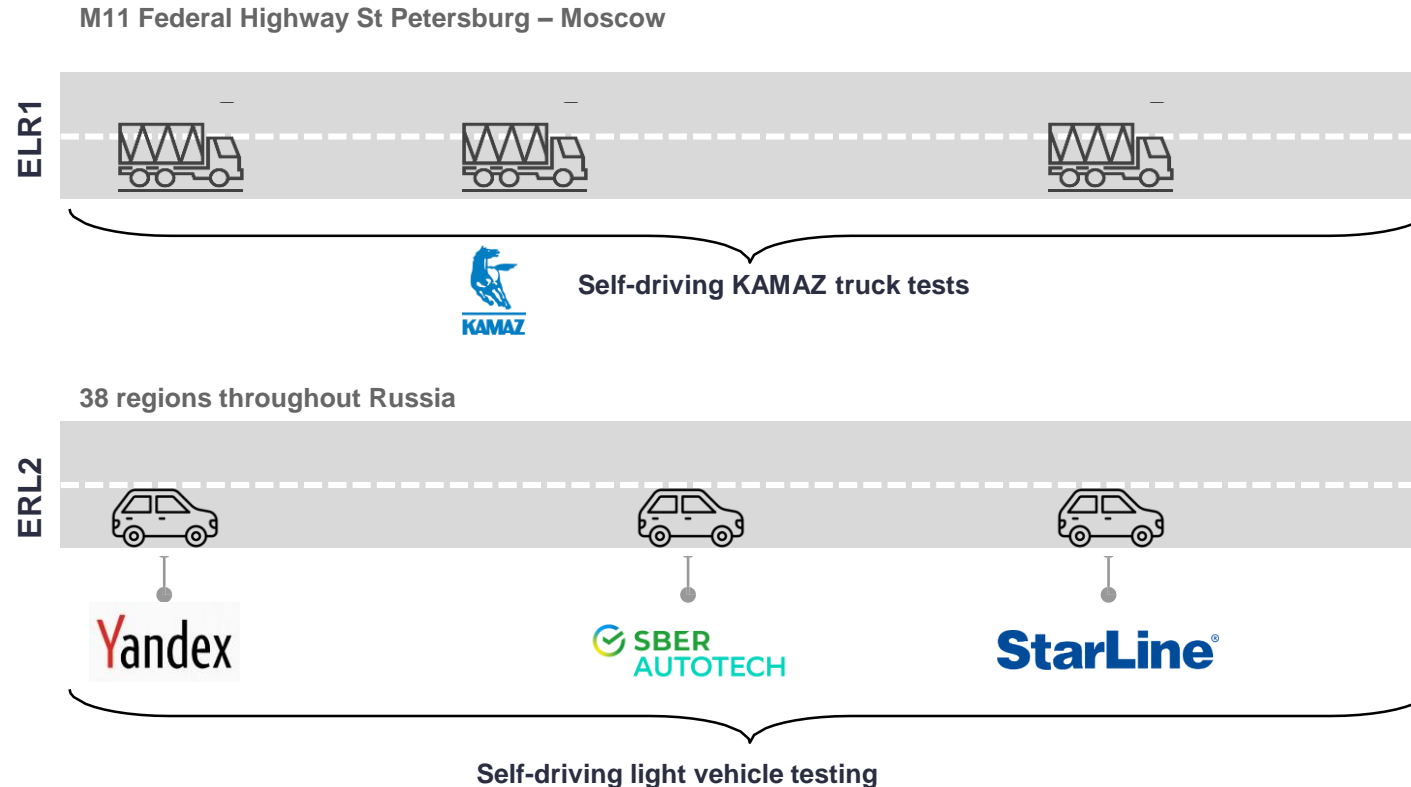
#### Standardisation

By 2025, Chinese standards supporting the autonomous driving are expected.

\*There are 5 levels of driving automation ranging from L0 to L5 where L0 (fully manual) and L5 (fully autonomous)

# Self-driving vehicle testing in Russia takes place under experimental legal regimes (regulatory sandboxes)

The main law on driverless vehicles is currently being drafted



**Federal law on highly automated vehicles (HAV)\* is the main document regulating operation of self-driving vehicles in Russia**

*\*Almost finalised*

**ERL** is the experimental regulation that governs self-driving vehicle testing in Russia.

So far, no regulatory framework is available for fully autonomous (without a driver) vehicle testing.

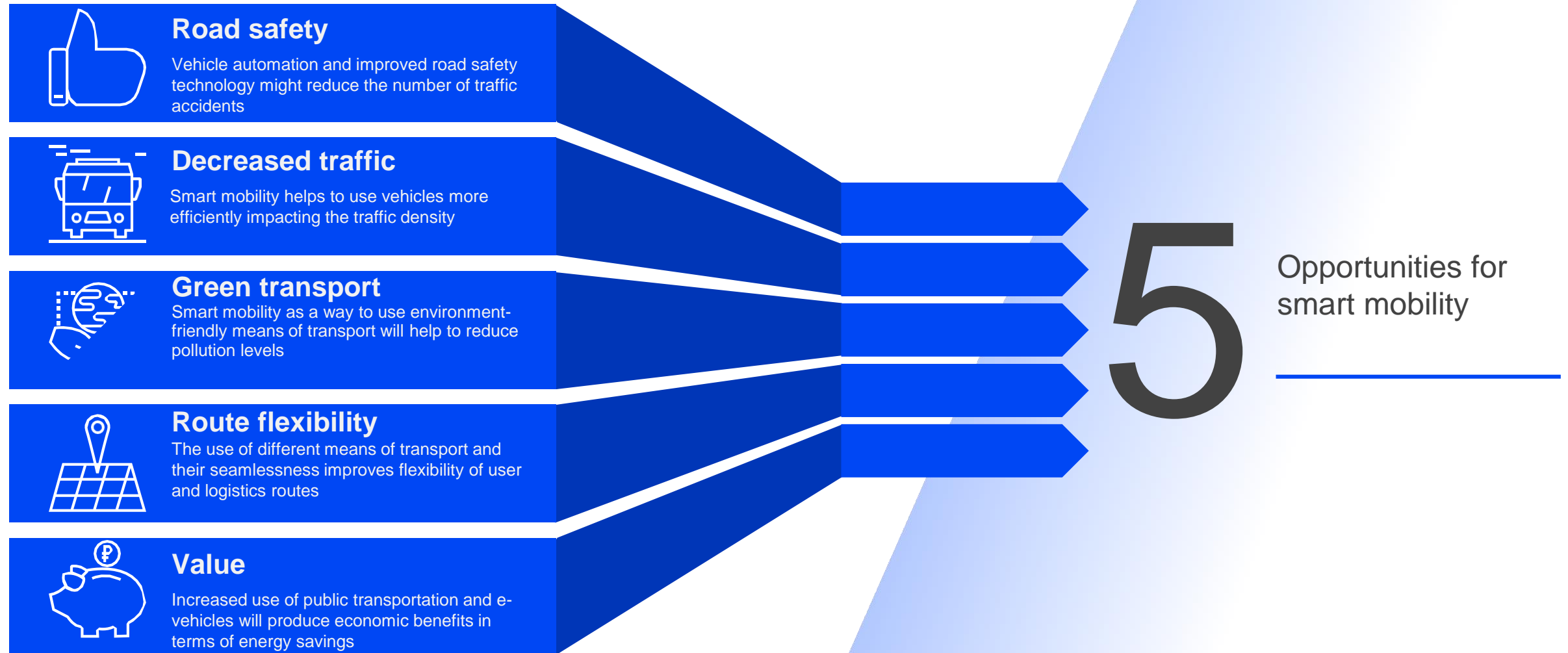
Tests are performed with a driver (the only exception is the Innopolis Territory in the Skolkovo Centre of Innovation).





# The smart mobility ecosystem might be adopted to achieve 5 main benefits

## Benefits of smart mobility



# Coordinated policies, regulatory framework and partnerships – 3 main stages of smart mobility adoption



## Stage 1. Smart mobility holistic policy and strategy

- Current **challenges** around mobility (mainly relating to safety, affordability and sustainability) need to be evaluated and clearly defined.
- Then, wider **policies** for the adoption of smart mobility technology need to be developed.
- Once the problem has been defined and relevant policies have been adopted, a smart mobility **strategy** for a specific city needs to be articulated.
- After the strategy has been approved, a realistic **plan** with timeframes and KPIs needs to be developed.



## Stage 2. Institutional and regulatory framework

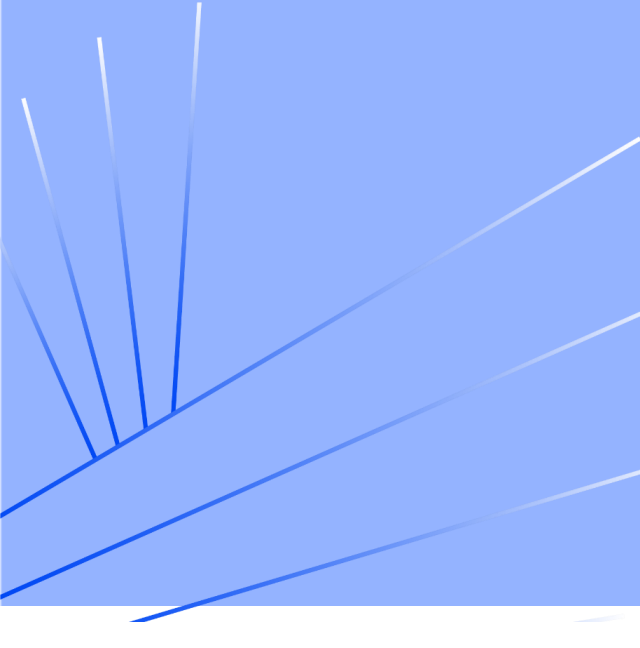
- Institutional and regulatory framework ensures that authorities are prepared for the adoption of smart mobility systems. This way the responsibilities of different parties are defined.
- This is also how the single standardisation of required smart mobility elements is achieved.
- Opportunity to develop government incentives for the promotion of smart mobility and transport on the whole.



## Stage 3. Partnerships

- It is important to establish effective interaction both within **public agencies** and enter into partnership agreements with **the private sector**.

# Key takeaways

- 
1. The global automotive market shrinks due to the transition to a new car composition and alternative types of transport. Smart mobility gains relevance.
  2. To effectively develop smart mobility in Russia, it is recommended to consider 6 pillars of the smart mobility ecosystem.
  3. Improved user experience, such as seamless payment for mobility services that is currently not offered by the Russian MaaS solution, might considerably increase its popularity among Russian users.
  4. The smart mobility market maturity in Russia is in line with the global trends, as regards the development of mobility innovations.
  5. One of the barriers for further development of smart mobility in Russia is a delay in 5G coverage roll-out relative to largest global players (US, China, Finland, other), specifically due to problems with imports. Therefore, it is important to establish relationships with key players (for example, China).
  6. To promote smart mobility, including in Russia, it is recommended to first develop the smart mobility adoption policy and strategy, then put in place an appropriate regulatory and institutional framework, followed by the implementation of technology, fostering the collaboration both within the public sector and with the private sector.



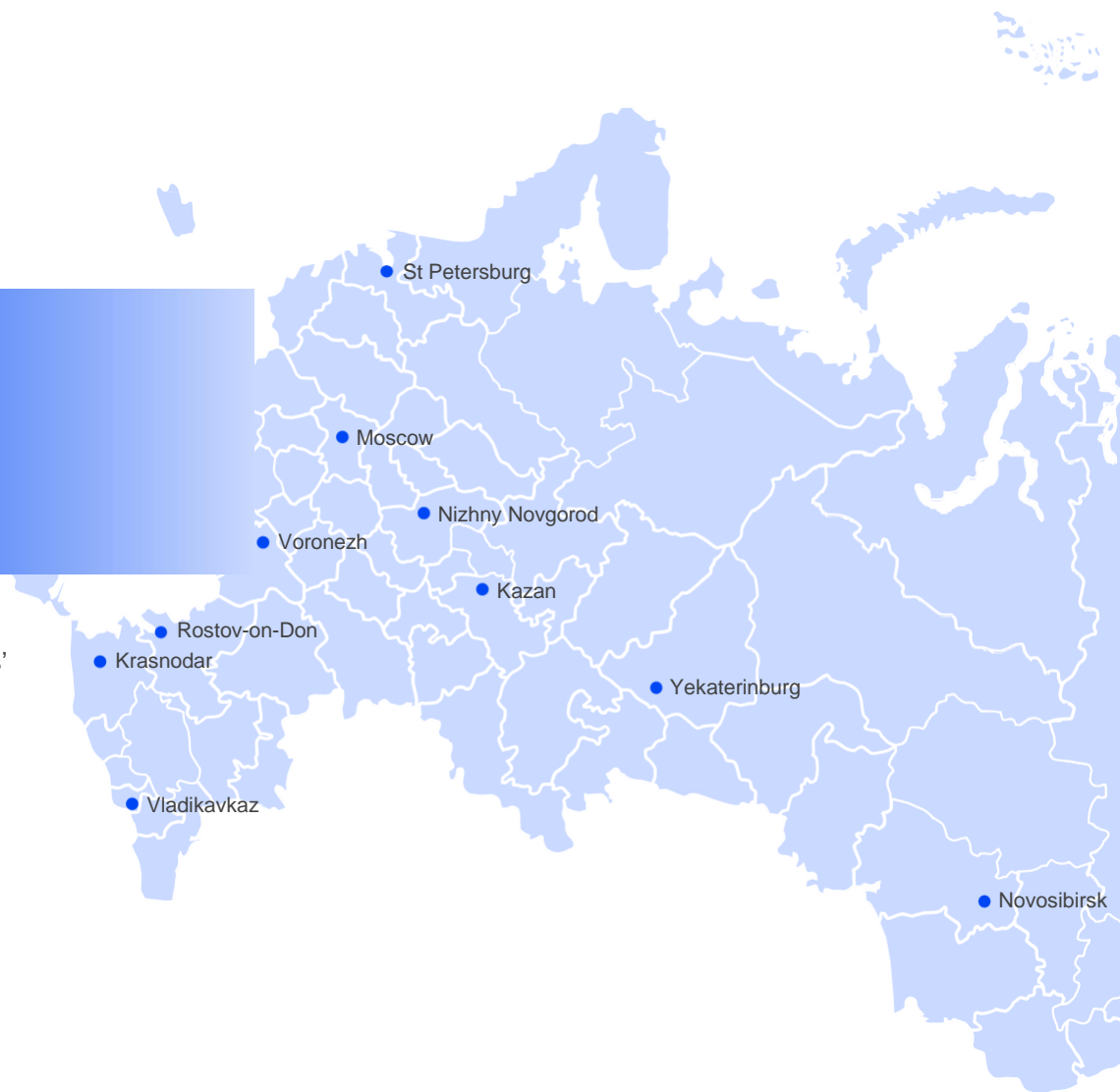
# About Technologies of Trust



# Map of Russia with cities of presence

> 3,000 clients  
Including 224 RAEX-600  
clients

80% of top 50 RAEX-600 companies' revenue is generated by TeDo's clients across all lines of service.  
26% of top 100 RAEX-600 companies are TeDo's audit clients.



**TeDo** is one of the leading audit and consulting firms in the market with a more than 30-year history. We are committed to a long-lasting presence and sustainable leadership in the Russian and CIS markets.

At TeDo, our purpose is to help business grow and build trust with employees, shareholders, consumers and wider stakeholders.

TeDo is present in **10 cities** across Russia being the member of numerous business associations and the permanent knowledge partner of large Russian and international events.

## Our audit and consulting clients include:



8 of the 10 largest financial companies and banks



10 of the top 10 oil and gas companies



10 of the 10 largest metals and mining companies



9 of the 10 largest wholesale and retail companies



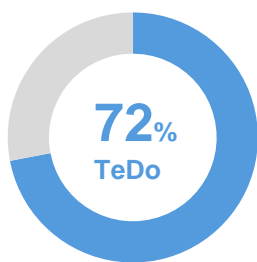
7 of the 10 largest transport and logistics companies



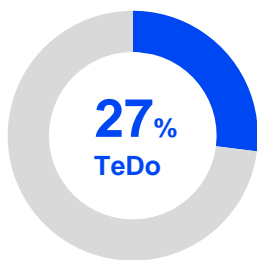
7 of the top 10 power industry companies

# TeDo Russia's automotive industry credentials

8 of the 11 top 100 automotive companies are TeDo's clients across all lines of service



3 of the 11 top 100 automotive companies are TeDo's audit clients



Source: Technologies of Trust, Expert-600 rating, October 2022

## TeDo selected automotive industry clients in Russia

Avilon Automobile Group*	Magna Automotive Rus*	Tenneco Automotive Volga*
Avtovaz*	Mazda Motor Rus	Toyo Tires Rus
AgroCentre Holding	MAZDA SOLLERS Manufacturing Rus	Toyota Boshoku*
Asia Auto Ust-Kamenogorsk	MAHLE RUS*	Toyota Motor*
Automotive Glass Alliance Rus	MAN Trucks and Bus Rus*	Toyota Tsusho Technics*
Automotive Lighting	Mercedes-Benz RUS	Federal Mogul Powertrain Vostok
BMW Russland Trading	Mitsubishi Corporation	Volkswagen Group Rus*
Bosch Rexroth*	MMC Rus	Ford Motor Company*
Bridgestone CIS	NVH RUS	Ford Sollers Automotive Components*
Bridgestone Tire Manufacturing CIS	NGK Spark Plugs (Eurasia)	Ford Sollers Elabuga*
Brose Togliatti Automotive	Nizhnekamskshina*	Ford-Sollers Holding*
Volvo Vostok*	Nissan Manufacturing Rus	Faurecia Group*
Voronezh Tire Plant	Peugeot Citroen Rus	Fujikura Automotive Rus Cheboksary
GAZ	Pirelli Tyre Russia*	Fuyao Glass Rus*
Goodyear Russia*	PCMA Rus	Hankook Tire Co Ltd
DAIMLER KAMAZ Rus	Porsche Russland*	Hyundai Motor CIS
JCB Russia	Renault Russia*	Hyundai Truck and Bus Rus*
Johnson Controls	ROLF*	Hyva Russia*
Ingersoll-Rand Services and Trading*	Skania-Peter*	URAL Automobile Plant
Inchcape Holding*	Scania-Rus*	Zeppelin Russland
KAMAZ	SCF*	ZF KAMA*
Caterpillar Eurasia*	SOLLERS*	Schmitz Cargobull Russland*
Caterpillar Tosno*	SP BUSINESS CAR*	Unipress Rus
KIA Motors Rus	SUZUKI MOTOR Rus	Jaguar Land Rover



# We have the leading automotive practice in Russia

## How we can help automotive companies



What should my company's strategy look like to ensure success in the market? How can I achieve my shareholders' objectives? What is my business worth?



Market analytics: where are future market trends heading and what could the anticipated demand for automobiles and machinery amount to?



Searching for sources of financing and partners: how do I negotiate the best terms for my deal?



Driving business efficiency: what is the best organisational structure and headcount for my company? Which business processes lend themselves well to automation?



Impact analysis of the latest and anticipated amendments in tax and customs legislation



Legal issues arising from business incorporation, restructuring and value protection



Ensuring the transparency of financial reporting and improving trust among creditors, investors, shareholders and business partners in the information provided to them

## Our competitive edge

1

Our industry-based approach enables us to focus the firm's resources, expertise and knowledge on specific areas and types of services. Our team has gained profound expertise in the specifics of the automotive industry.

2

We are well-versed in industry best practice and can bring in leading subject-matter experts to assist us, all of which helps us find the most efficient and innovative ways of resolving our clients' issues.

3

The automotive industry is one of the priorities for TeDo in Russia. We work with various industry players: Russian and multinational companies, vehicle and component manufacturers, importers and distributors.

4

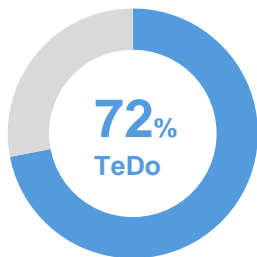
Our activities in the automotive sector go beyond providing advisory services to our clients. We also engage extensively in professional conferences, network with industry associations and publish our expert opinions and research findings in the mass media.

5

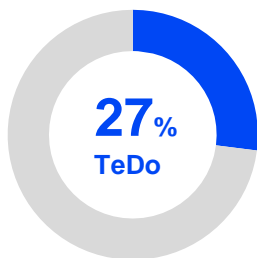
We have comprehensive knowledge of our clients, as TeDo Russia provides auditing and advisory services to 63% of the country's automotive leaders.

# We are the leading automotive practice in Russia

**8 of the 11** top 100 automotive companies are TeDo's clients across all lines of service



**3 of the 11** top 100 automotive companies are TeDo's audit clients



**TeDo strives to be at the forefront of latest developments in the automotive industry and share the most relevant ideas and insights with our clients.**

## Keeping this in mind, TeDo:

- Conducts **detailed research** devoted to the current state of the automotive industry and to its development issues;
- Holds **specialised workshops and roundtables** for the automotive industry clients on industry and business development issues;
- Participates in **key industry events**;
- **Sponsors** key industry events and research.

**TeDo collaborates with Autonet NTI and the Russian Automobile Dealers Association (RADA) and participates in its annual conferences.**

**TeDo partners with the State Scientific Centre of the Russian Federation (NAMI).**

**TeDo is a member of the Association of European Business (AEB).**

Source: Technologies of Trust, Expert-600 rating, October 2022



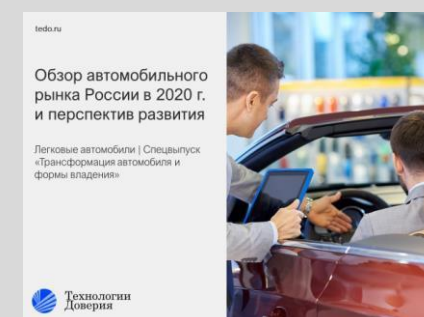
Digital transport mobility market trends



Russian automotive market 2021 results and outlook



Driving the future: understanding the new automotive consumer



Russian automotive market 2020 results and outlook.

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