



SMART MOBILITY – SMART CITY

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Associate partner

Education

Master of Applied Economics,
Vilnius university, 2007

Work experience

Civitta, 2012-now
Ernst & Young, 2007-2012

Certificates

LEAN, 2013
PRINCE2, 2011
EFQM Leader of Excellence, 2011



SOMETIMES IN ORDER TO ARCHIEVE RESULTS YOU
NEED TO CHANGE ANGLE OF THINKING

Civitta is a leading independent consultancy in the Emerging Europe

AT GLANCE

- ✓ Partner-owned firm with 16 offices in 10 countries:
Belarus, Estonia, Latvia, Lithuania, Moldova, Romania,
Russia, Serbia, Ukraine + UK sales office

- ✓ 200+ employees

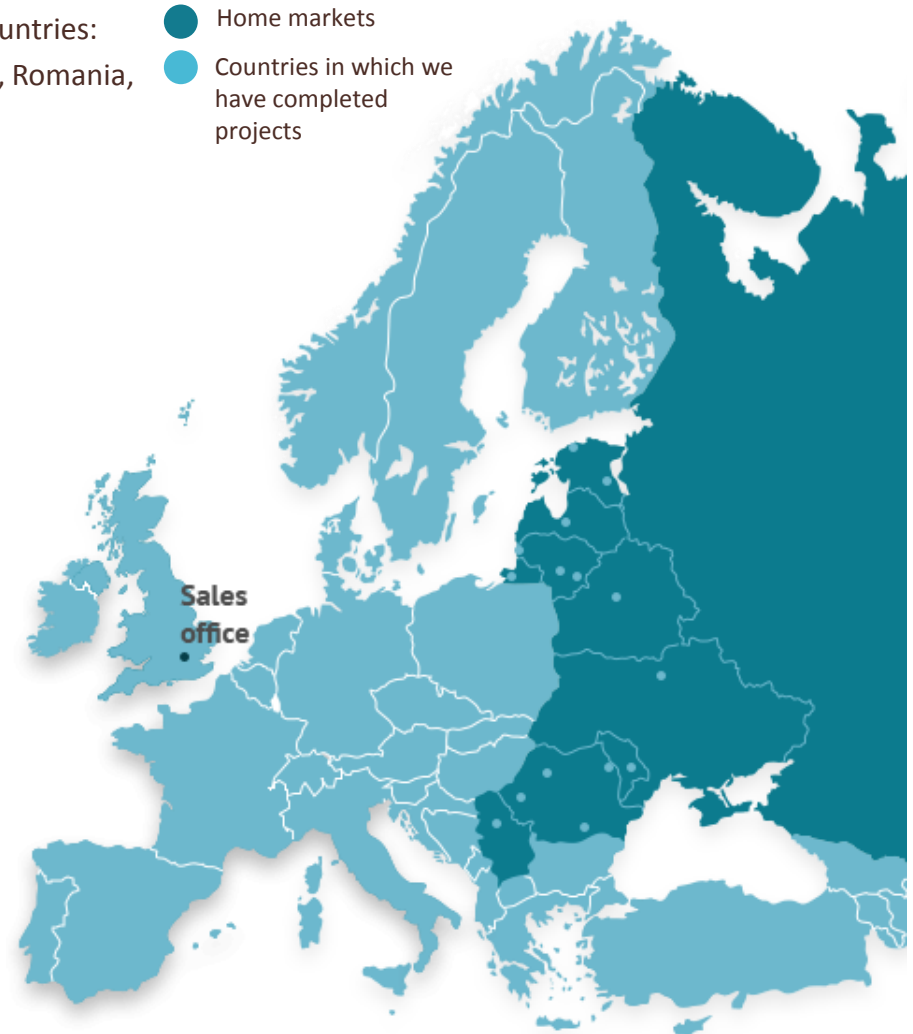
SERVICES

- ✓ Management Consulting (Strategy & Innovation, Organization, Processes & Change, Sales & Export, Finance, IT)
- ✓ Grants & Project Management
- ✓ Market Research & Data Analytics
- ✓ Entrepreneurship Support & Startups
- ✓ Public Policy & Development

CLIENTS







- ✓ Central and local governments
- ✓ International organizations
- ✓ Education and R&D
- ✓ Health and social work
- ✓ Energy and Utilities
- ✓ Financial and insurance services
- ✓ Professional services
- ✓ Telecommunications and ICT
- ✓ Manufacturing
- ✓ Retail and wholesale
- ✓ Food and FMCG
- ✓ Transportation and infrastructure
- ✓ Startups and innovation

- Home markets
- Countries in which we have completed projects

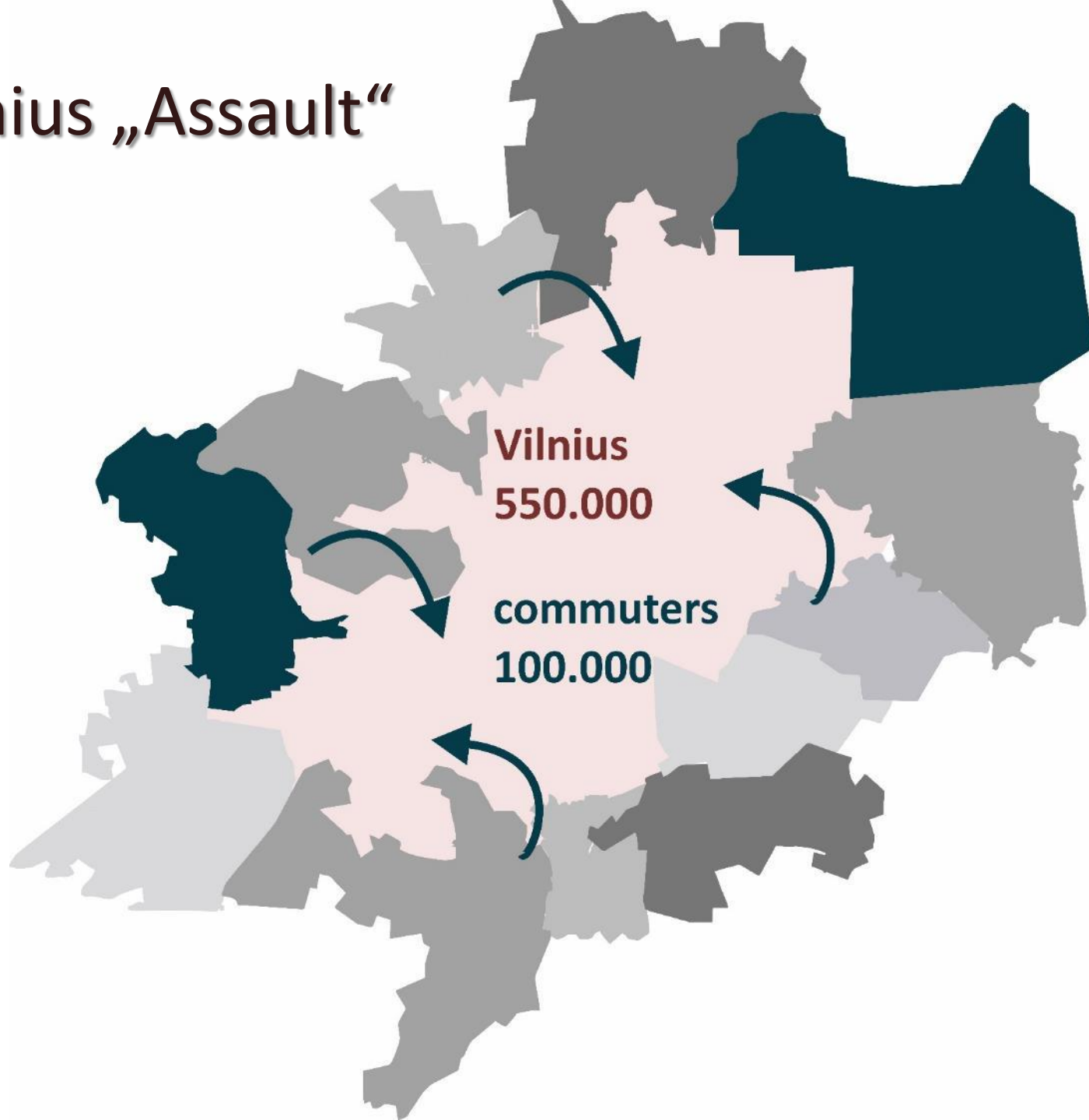


We also worked in the US, Iran, Kazakhstan, Senegal, Egypt, Malaysia, Zambia, Cameroon, Ghana, Uganda and other countries

Relevant experience project examples

<p>2017</p>  <p>Mobility Services (Vilnius transport authority), LT</p> <p>AFC system specification and tender documentation preparation</p>	<p>2016-2017</p>  <p>Vinnytsyakartservis, Vinnytsia, UA</p> <p>Development of Public Transport Strategy and implementation of e.Ticketing</p>	<p>2017</p>  <p>Vilnius City Municipality, LT</p> <p>Public transport vehicles purchase analysis and financial modeling</p>	<p>2015</p>  <p>RB RAIL AS – railway transportation, EE</p> <p>Connecting Europe Facility 2014 application for the Rail Baltic railway line (grant of 424 mln. EUR)</p>
<p>2017</p>  <p>SUMP preparation for three Lithuanian cities, LT</p> <p>SUMP and ITS strategy preparation</p>	<p>2017</p>  <p>CityBee – mobility service provider, LT</p> <p>Car sharing, bike sharing and parking price optimization</p>	<p>2012</p>  <p>Ministries of Transport and Communications, Economy and Energy, LT</p> <p>Feasibility study for electric vehicles development in Lithuania</p>	<p>2013- 2014</p>  <p>Kaunas Trolleybus and Bus company, LT</p> <p>Consolidation and merger of public transport companies in city of Kaunas</p>

Vilnius „Assault“



Car – very inefficient means of transportation

Cars stand still 23
out of 24 hours a
day

When driving 1,4
seats out of 5 is
used

40-80 hours yearly
wasted time in
congested traffic
(2000 Eur / year)

Petrol and diesel
motors use 30 –
40% of energy

Road infrastructure
is used around 20%
of the time

All together an
efficiency of
around 5%

Key mobility challenges of Vilnius

- Ownership of the cars in Vilnius is growing
- Congestion is growing
- Road infrastructure development can't keep up
- Commuters come by car because of weak public transport outside the city
- Densification of the city will lead to increased mobility demand

How to support city growth, while ensuring increased livability, high mobility and improved sustainability?

Alternatives for further development

1 alternative

Invest in road infrastructure



Big investment



Further increase in car usage and congestion



2 alternative

Invest in technology



Relatively small investment



Smart mobility



We cannot solve our problems with the same thinking we used when we created them

- Albert Einstein

MOBILITY-AS-A-SERVICE

MOVING FROM:

- Vehicle-level focus
- Independent
- Unconnected
- Subject to behaviors & decisions

TO:

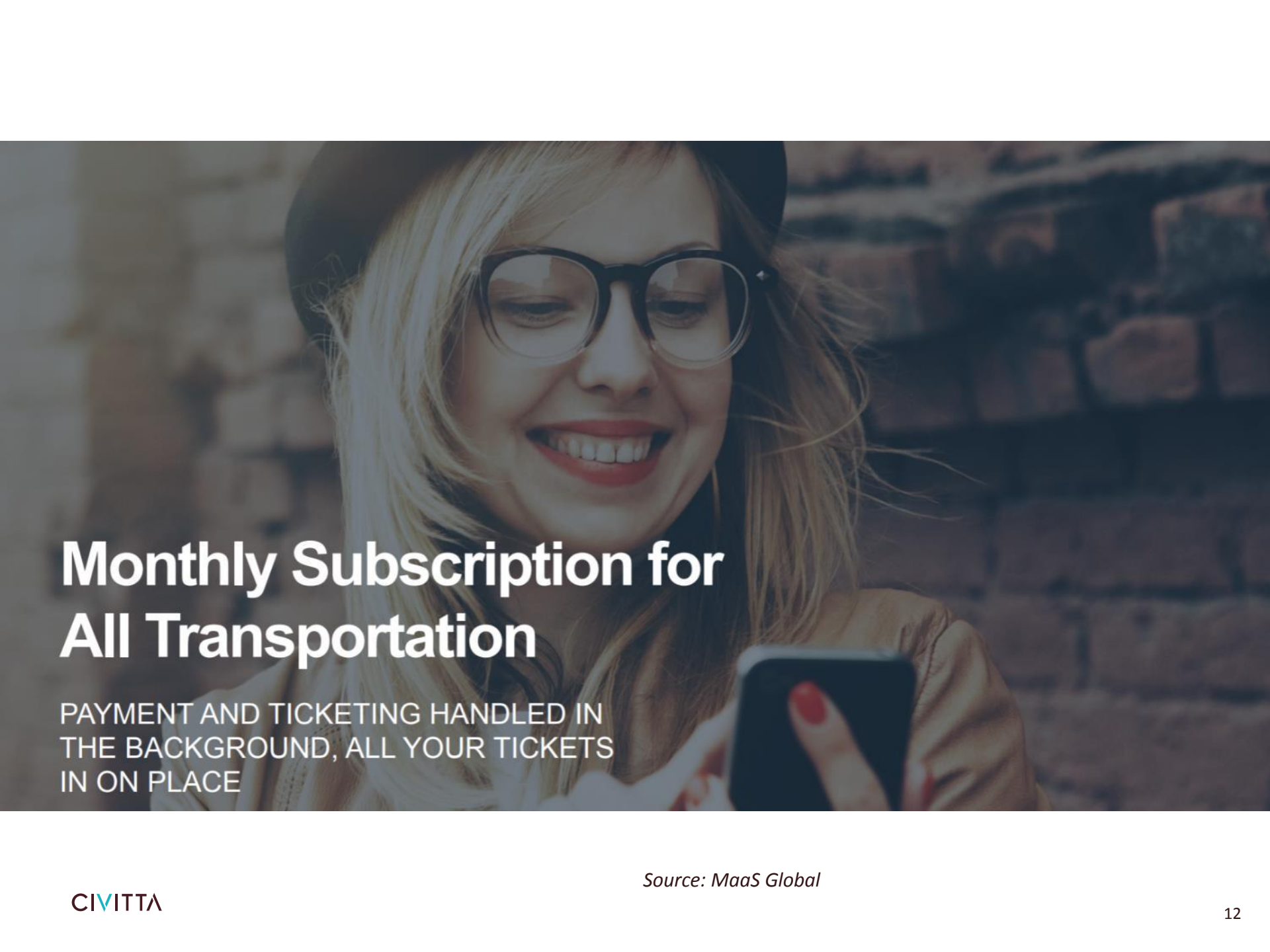
- System-level focus
- Connected
- Automated
- In sync
- Across modes
- Managed behaviors & decisions
- Agencies working together (energy, safety, mobility)

Better than Owning a Car

VARIETY OF OPERATORS AND TRANSPORT PROVIDERS, IN ONE PLATFORM, ONE SINGLE SOLUTION (APP)



Source: MaaS Global



Monthly Subscription for All Transportation

PAYMENT AND TICKETING HANDLED IN
THE BACKGROUND, ALL YOUR TICKETS
IN ON PLACE

Source: MaaS Global

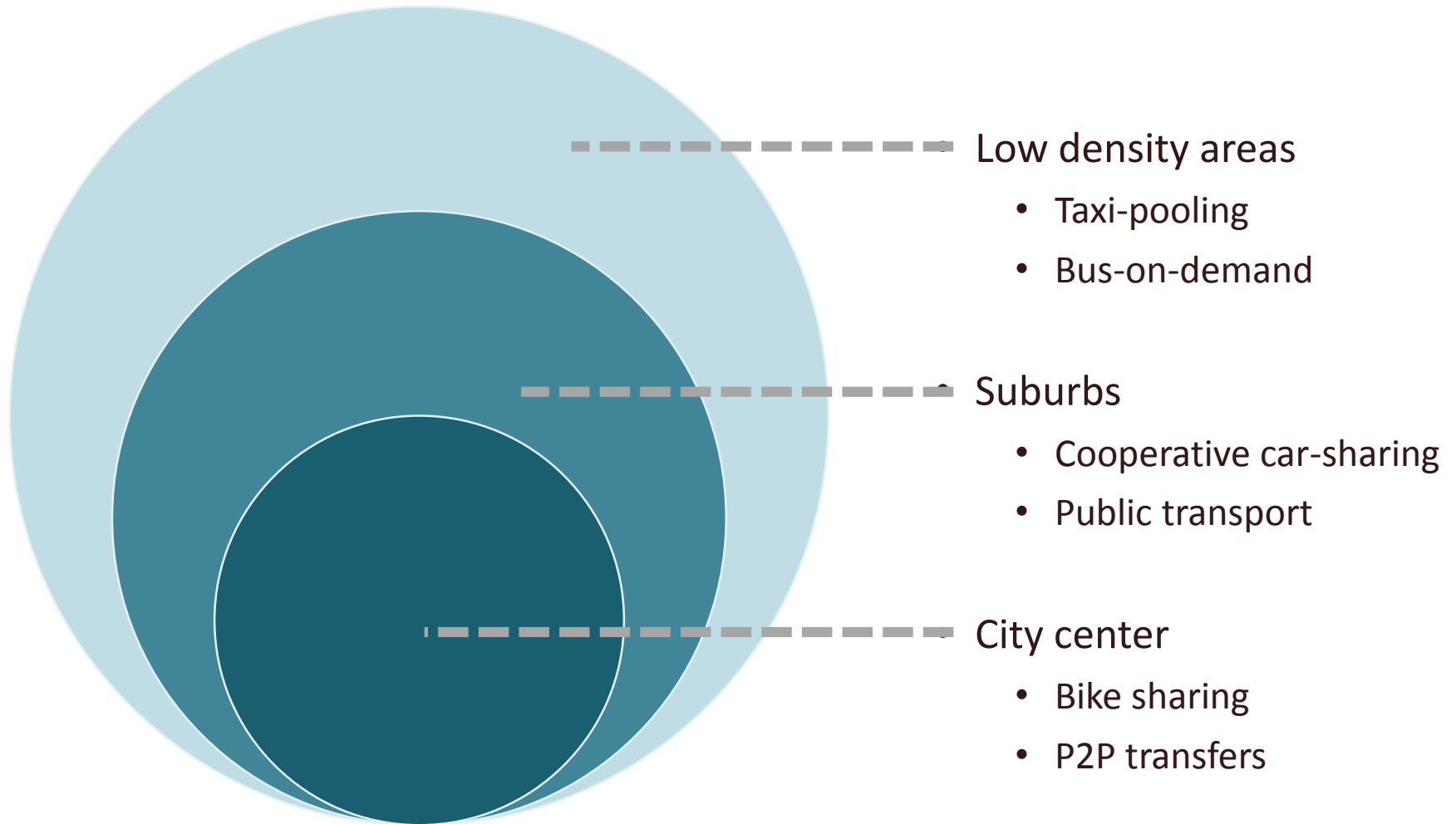
A close-up photograph of a person's hand holding a set of car keys. The person is wearing a light-colored jacket. The background is blurred, showing some greenery and a building. The text is overlaid on the left side of the image.

From Ownership to Experience

WHY OWN AND DRIVE AN OLD CAR – WHEN YOU
COULD USE A BRAND NEW ONE, WHENEVER YOU
NEED?

Source: MaaS Global

VISION – MaaS will provide better level of transportation service than private car has



MaaS provides big benefits both passenger and operator

PASSENGER

- No need for ticket
- Lowest fares
- Always available
- Easy control

OPERATOR

- Be in/out ticketing system
- No hardware required
- Clear revenue division
- Passenger flow steering



MaaS market approach



Urban commuter package for 95 €/month:

- * Free public transport in home city area
- * Up to 100 km free taxi
- * Up to 500 km rental car
- * Domestic public transport 1500 km

15 minutes package for 135 €/ month:

- * 15 minutes from call to pickup by shared taxi
- * EU wide roaming for shared taxi at 0,5 €/km
- * Free public transport in home city,
- * Domestic public transport 1500 km



Business world package for 800 €/month:

- * 5 minutes pickup in all EU
- * Free taxi in home city
- * Lease car and road use
- * Taxi roaming worldwide

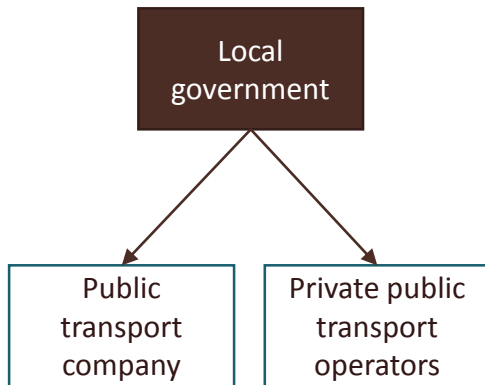
Family package for 1 200 €/month:

- * Lease car and road use
- * Shared taxi for all family with 15 minutes pickup
- * Home city public transport for all
- * Domestic public transport 2 500 km

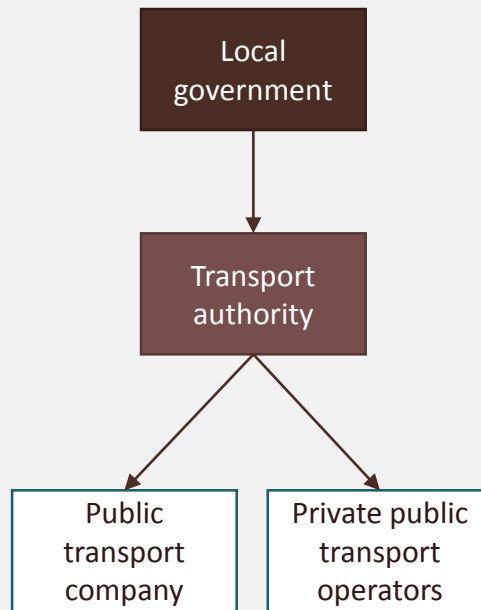


Public transport organization legal framework

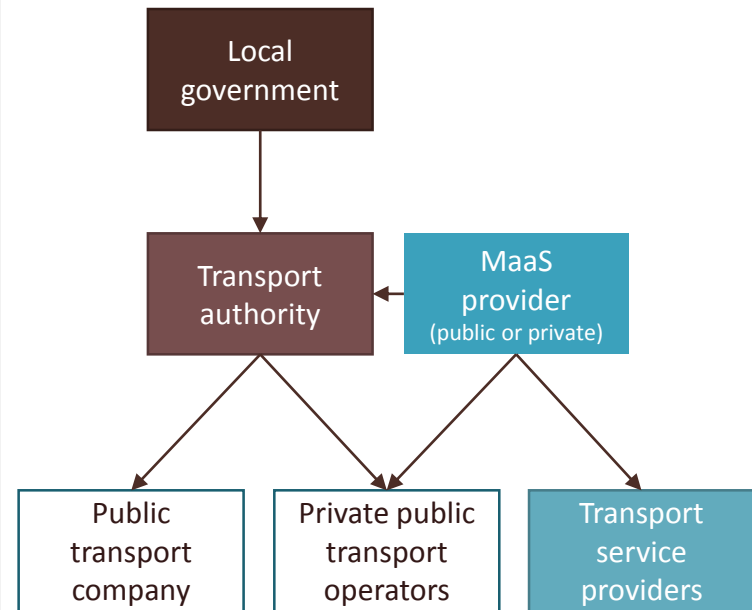
Common practice



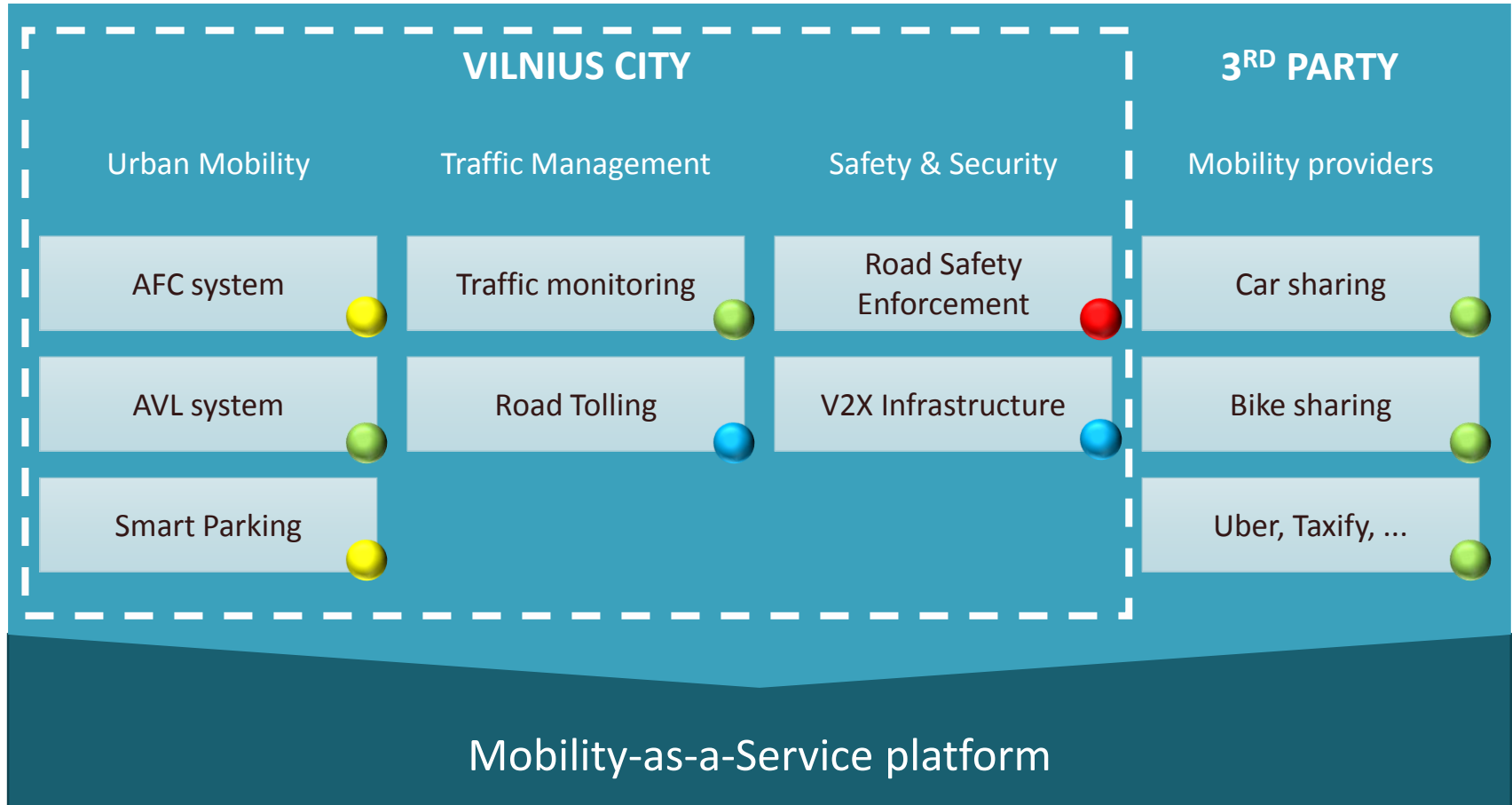
Recommended practice



MaaS inclusion



ITS investment directions in Vilnius



Vilnius AFC system

- Implemented in 2007
- Upgraded in 2012
- Now being replaced

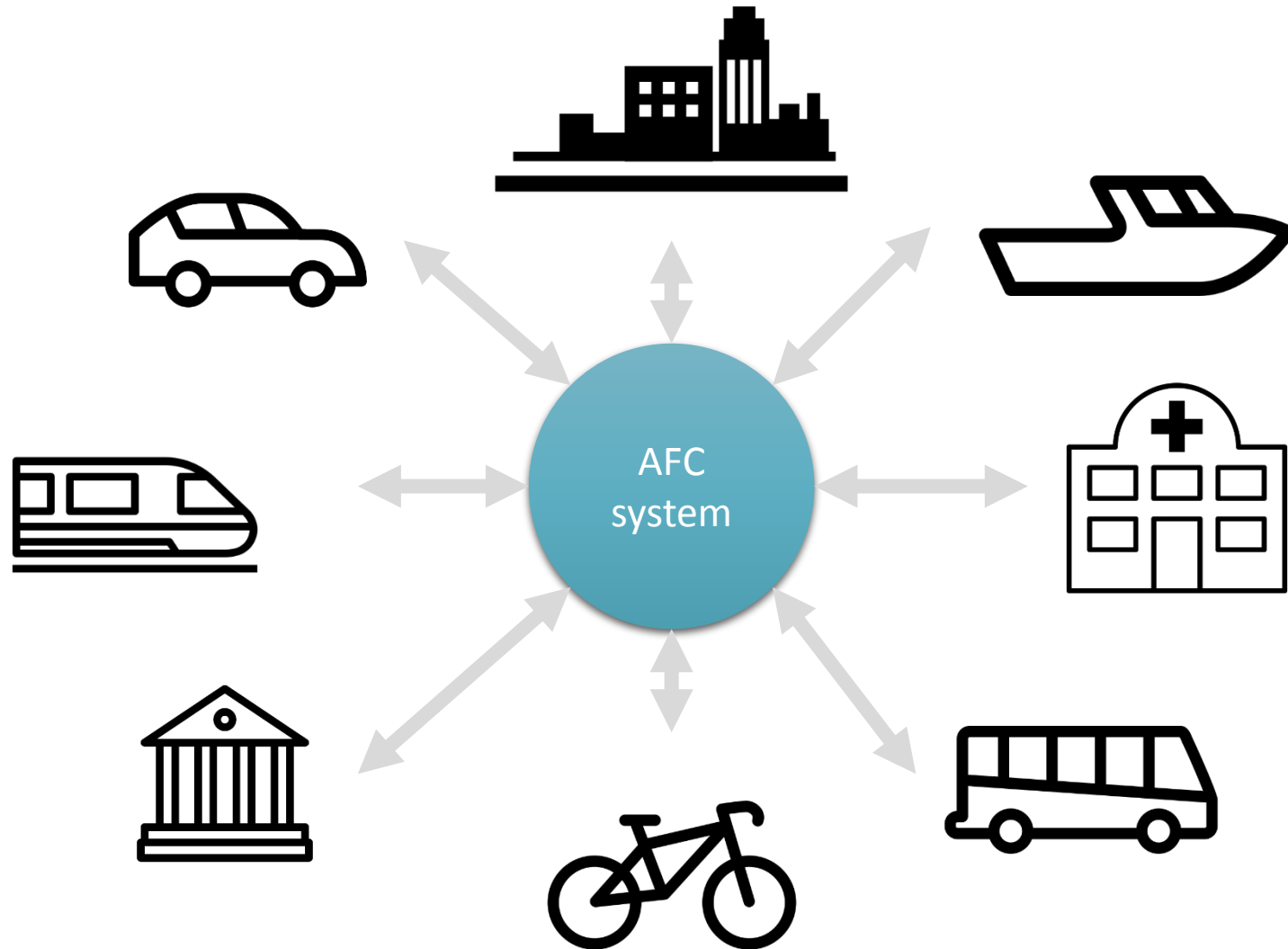
- Key issues
 - Vendor owns the keys
 - Often hardware failures
 - Slow data connection from PTV
 - Limited development options
 - Top-up errors in POS
 - No interoperability
 - Limited functionality of control

A nighttime cityscape featuring a river in the foreground, illuminated by streetlights and building lights. The background shows a dense urban area with various skyscrapers and modern architecture under a dark blue sky. A semi-transparent white trapezoidal shape is overlaid on the right side of the image, containing text.

Principles of the new AFC system

- **Interoperability** – integration with other regions
- **Accessibility** – more ticket options
- **Flexibility** – add more products and use more options of pricing
- **Personalization** – loyalty discounts
- **Openness** – open protocols and modular architecture

AFC system: Interoperability



AFC system: Accessibility



AFC system: **Flexibility**

PRODUCTS

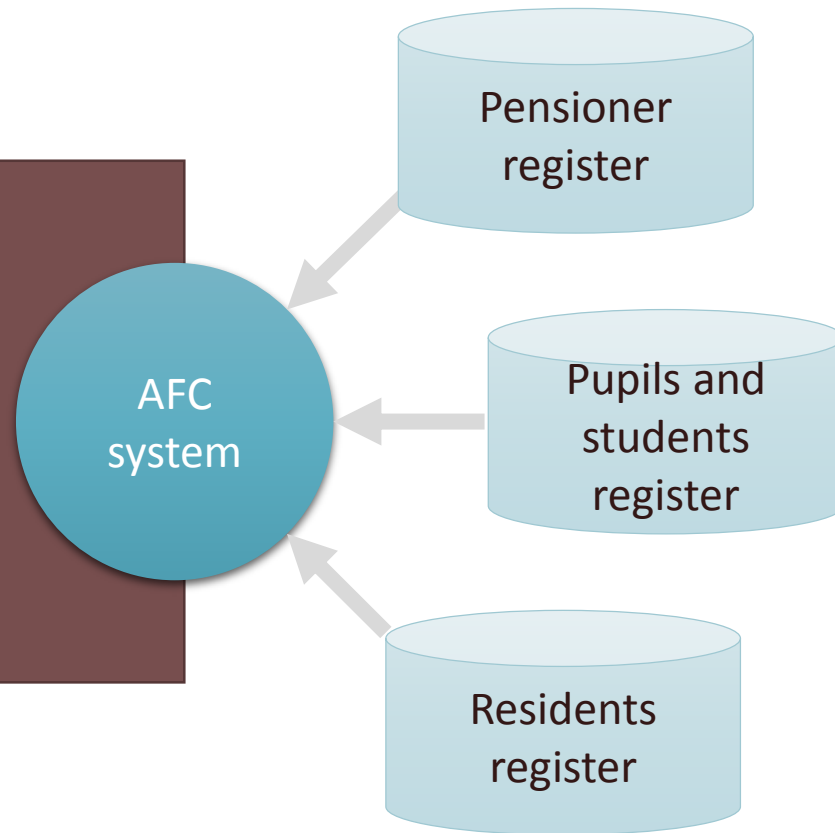
- CICO
- A to B
- BIBO
- Time
- Single transfer
- ...

PRICING

- Fixed
- Travel time / length
- PriceCap
- Zoning
- Loyalty
- Usage
- ...

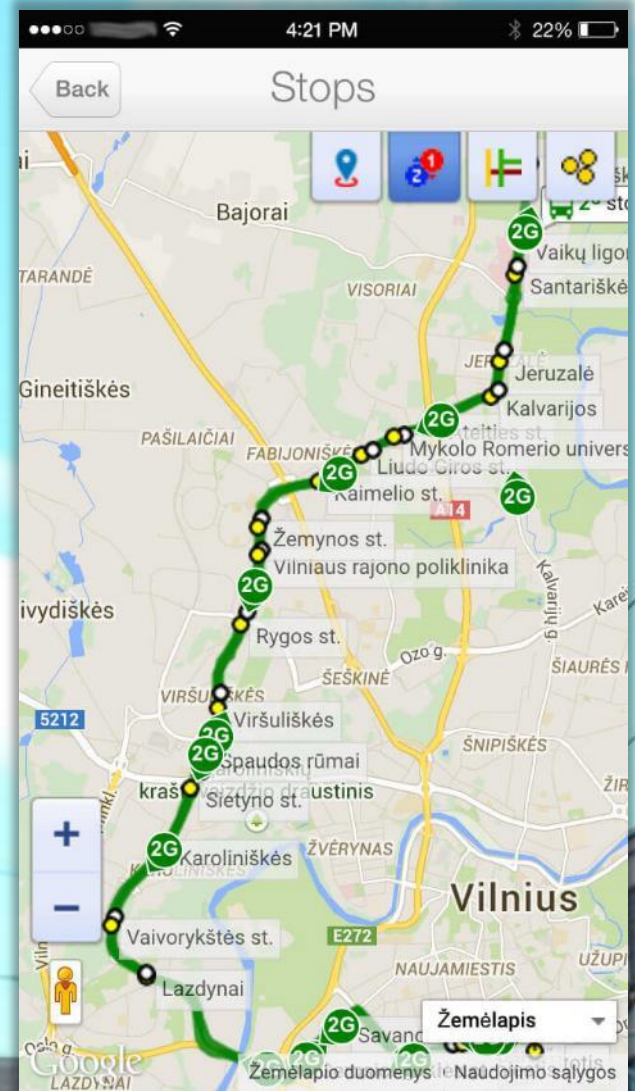
AFC system: **Personalization**

- Add as many ID as you wish
- Management of family tickets
- Automatic application of discounts
- Easy management of lost cards
- Faster control process



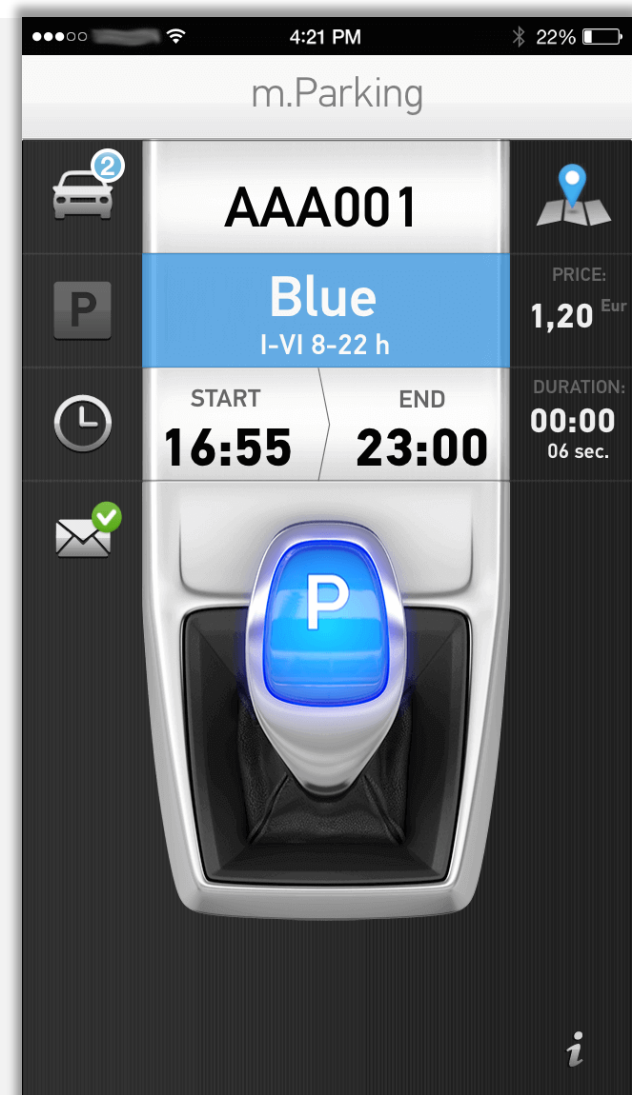
AFC system: **Openness**

- All system code transferred to purchasing organization
- Nothing stored at vendor site
- All protocols and keys transferred
- System is based on modular architecture and code can be edited
- Standard POS protocols – m.Ticket and self-service as POS
- Vendor must implement at least few different hardware providers validators and OBC (no lock on hardware)
- Vendor must show system ability to work with all key card types (no lock on card type)
- Integration with MaaS



m. Parking app for easy parking

- Automatic zone selection
- Identification through operator
- Credit card payments on the app
- Start-Stop system
- Automatic price change based on free parking spots available
- Auto stop at the end of the day
- Integration with AFC system
- Multiple tenants

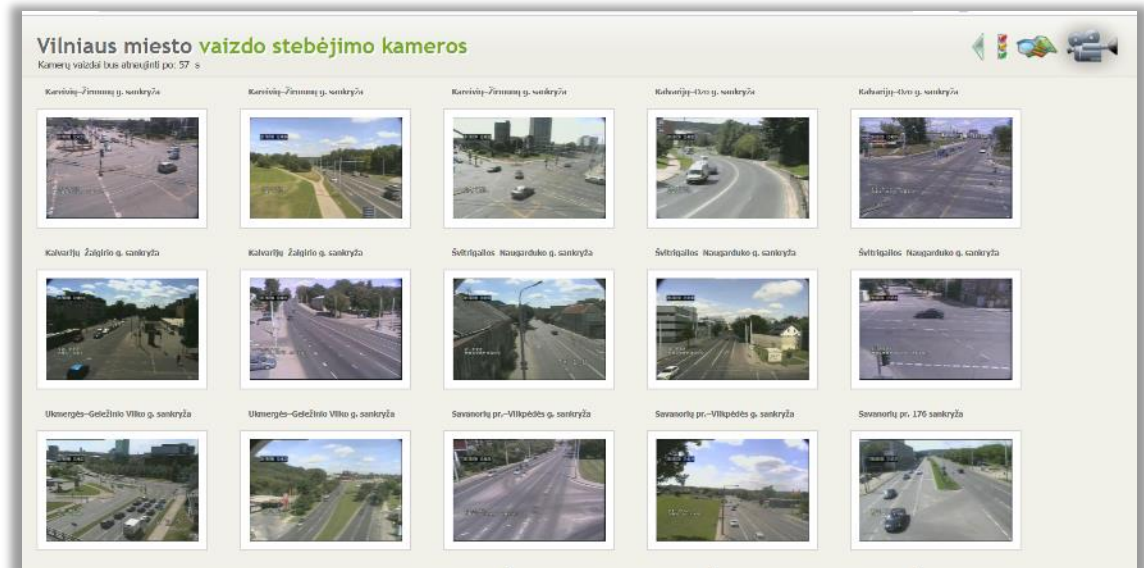


Traffic monitoring

- Real-time information
 - Travel times
 - Arrival times of public transport
 - Queue lengths at junctions and stations



- Additional needs
 - HD view
 - Parking availability
 - Crowdedness of public transport



Road Safety Enforcement: Cameras



Kalvariju-Ozo g. sankryža
Kamera 4 iš 74

- Outdated infrastructure
- Big margin of error (± 4 km/h)
- Detect only speed and red light

- Suitable for monitoring
- Totally unsuited for speed or any other violation detection

Road Safety Enforcement: Public transport lanes



- GPS aware public transport lane detection
- Automatic logging and fining of violators
- Cost – 50 Eur per unit

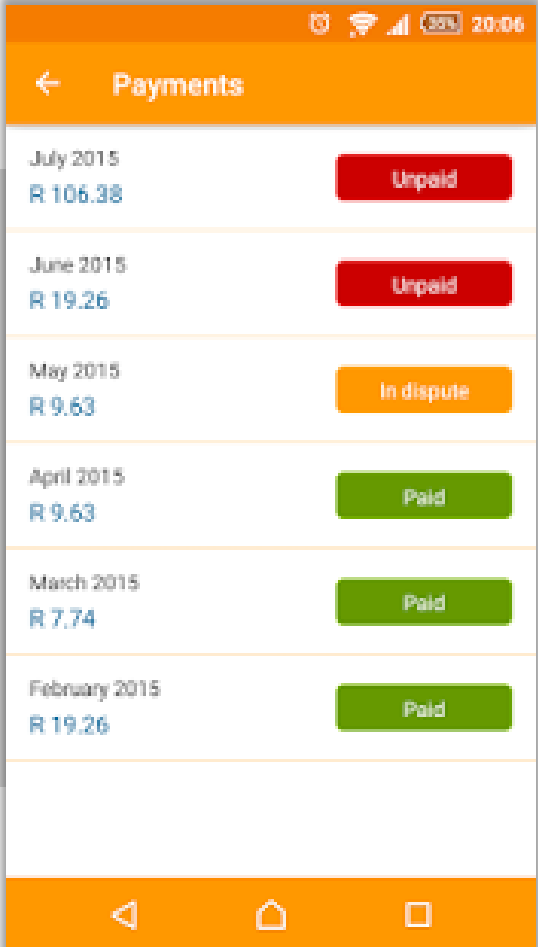
Road Safety Enforcement: Wish list

- Detection of:
 - speeding
 - jumping red signals
 - insurance
 - validation of car technical inspection
 - stolen car detection
 - tailgating
 - stopping in the yellow box at signal
 - illegal u-turn
 - illegal overtaking
 - changing lanes at intersections
 - use of cellphone
 - use of belt



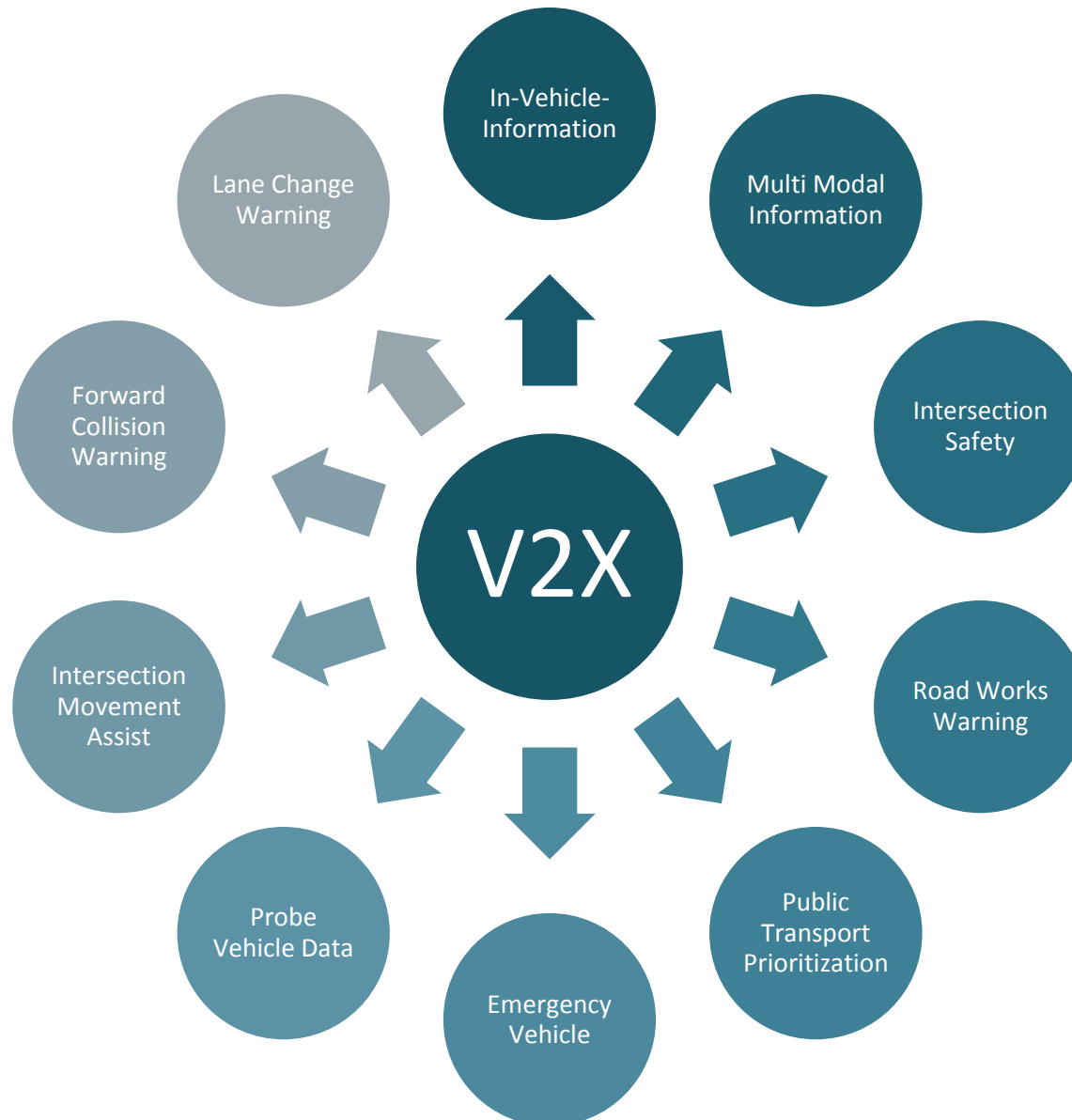
Infrastructure-as-a-Service: Road Tolling

- Use of e-vignette eliminates the costs for the production and distribution of the physical vignette.
- Efficient registration to the system in just a few steps.
- Utilizing modern distribution channels: Smartphone app and web terminal.
- Planned to be implement in some zones / streets of the city.



Month	Amount (R)	Status
July 2015	R 106.38	Unpaid
June 2015	R 19.26	Unpaid
May 2015	R 9.63	In dispute
April 2015	R 9.63	Paid
March 2015	R 7.74	Paid
February 2015	R 19.26	Paid

Connected services and V2X infrastructure





**OUR EXPERIENCE CHOOSING FUEL
TECHNOLOGY FOR PUBLIC TRANSPORT**

Selection of public transport vehicles: Operational characteristics

Bus technology/energy source	Fossil fuel			Biofuel				Electricity			Hydrogen	Hybrid
	Euro V	Euro VI	CNG	FAME B100	HVO B100	Bio-methane	Bioethanol	Opportunity	Overnight	Trolley	Hybrid hydrogen/ electric	Serial hybrid electricity/diesel
Fuel characteristics												
Renewable/not	Red	Red	Red	Orange	Orange	Orange	Orange	Green	Green	Green	Orange	Orange
Energy security	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Green	Green	Green	Orange	Orange
Operational performance												
Range, km	Green	Green	Orange	Green	Green	Orange	Green	Red	Red	Orange	Orange	Green
Zero emission range, km	Red	Red	Red	Red	Red	Red	Red	Green	Green	Green	Green	Orange
Route flexibility	Green	Green	Green	Green	Green	Green	Green	Red	Green	Red	Green	Green
Infrastructure												
Current market penetration	Green	Green	Orange	Green	Green	Green	Red	Red	Red	Red	Red	Green

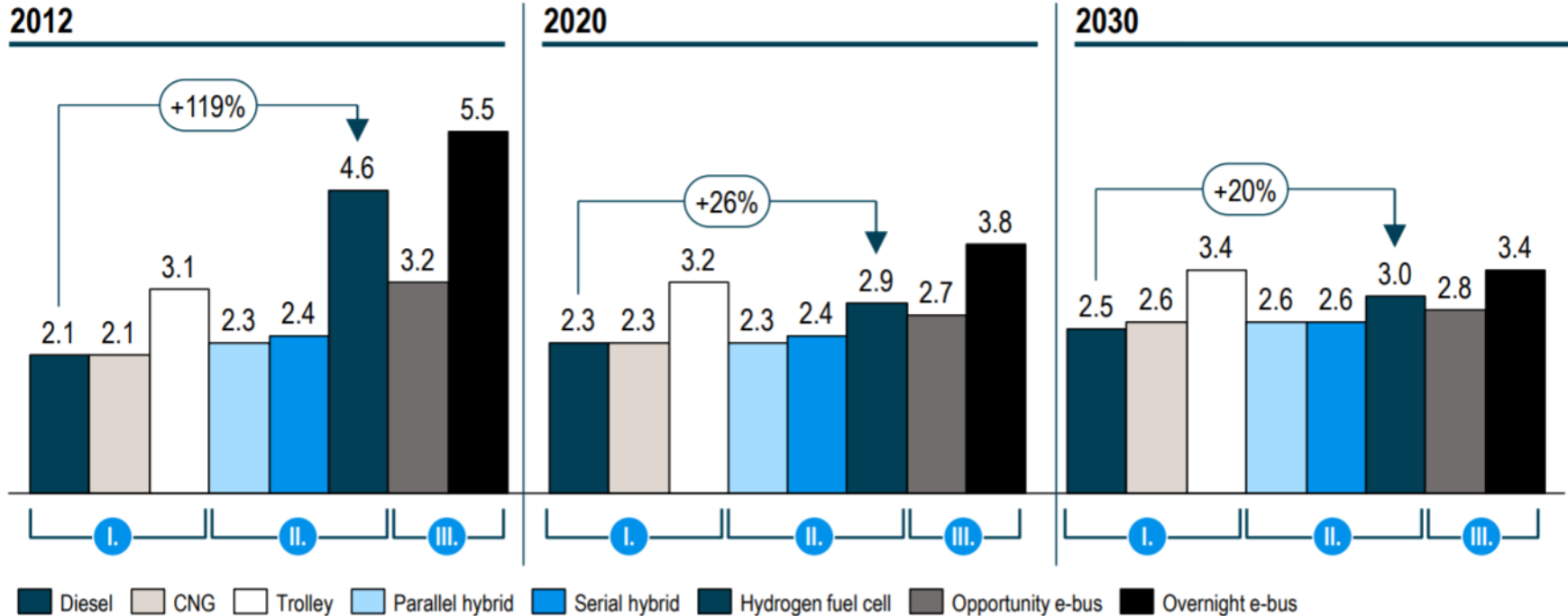
Source: TNO, where green represent the highest characteristics/performance within an indicator, red the less optimal option and orange the option in between.

Selection of public transport vehicles: Economic performance

Bus technology/energy source	Fossil fuel			Biofuel				Electricity			Hydrogen	Hybrid
	Euro V	Euro VI	CNG	FAME B100	HVO B100	Bio-methane	Bioethanol	Opportunity	Overnight	Trolley	Hybrid hydrogen/ electric	Serial hybrid electricity/diesel
Indication purchase price, 1000 euros	Green	Green	Green	Green	Green	Green	Green	Orange	Red	Orange	Red	Green
TCO 2012, euro/km	Green	Green	Green	Green	Green	Orange	Orange	Orange	Red	Red	Red	Green
TCO 2030, euro/km	Green	Green	Green	Green	Green	Orange	Orange	Orange	Orange	Red	Orange	Green
Additional infrastructure investment, 1000 euros	Green	Green	Red	Orange	Orange	Red	Red	Orange	Red	Red	Red	Green

Source: TNO, where green represents the cheapest option, red the most expensive option and orange an option in between.

Total cost of ownership of buses EUR/km



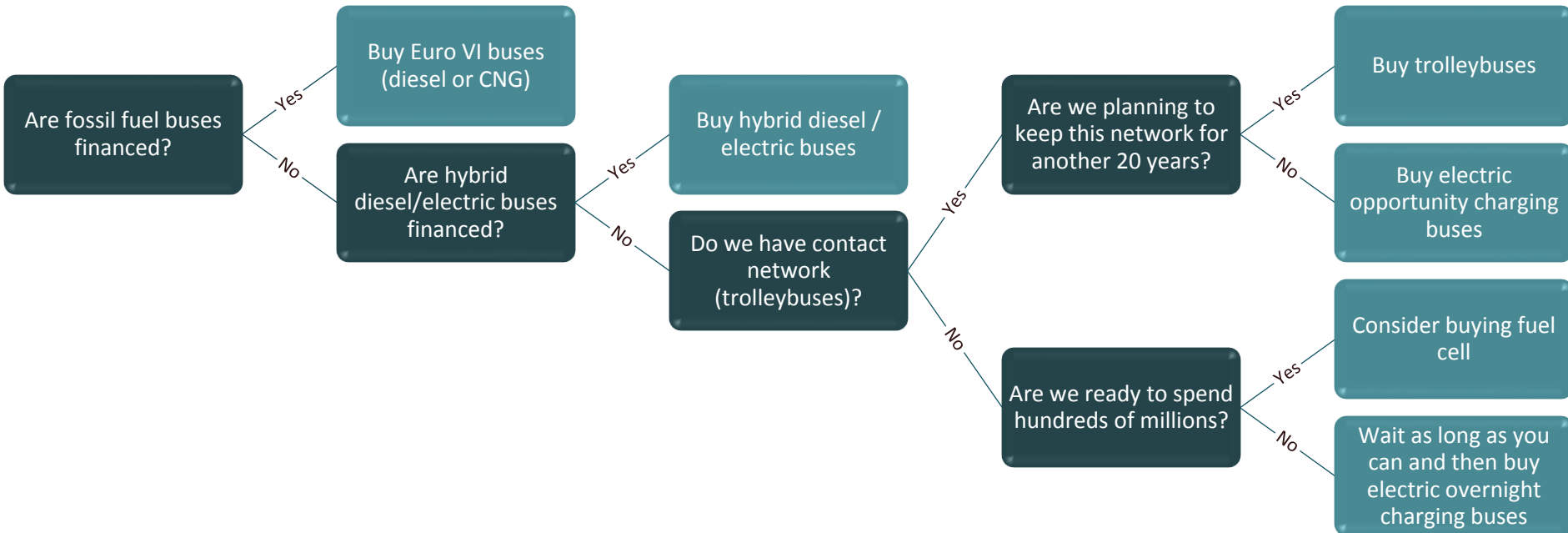
Labeling of power train according to degrees of operational experience (km driven):

- I.** Commercial solutions (>> 100 m km)
- II.** Test fleets (> 1 m km)
- III.** Prototype phase (< 10,000 km)

For 12 meter bus – Cross industry scenario

Source: Urban buses: Alternative powertrains for Europe

Decision tree for choosing fuel technology (our experience)





accumulated
experience

effective
methodology

long-term
effect

Next steps



1st stage



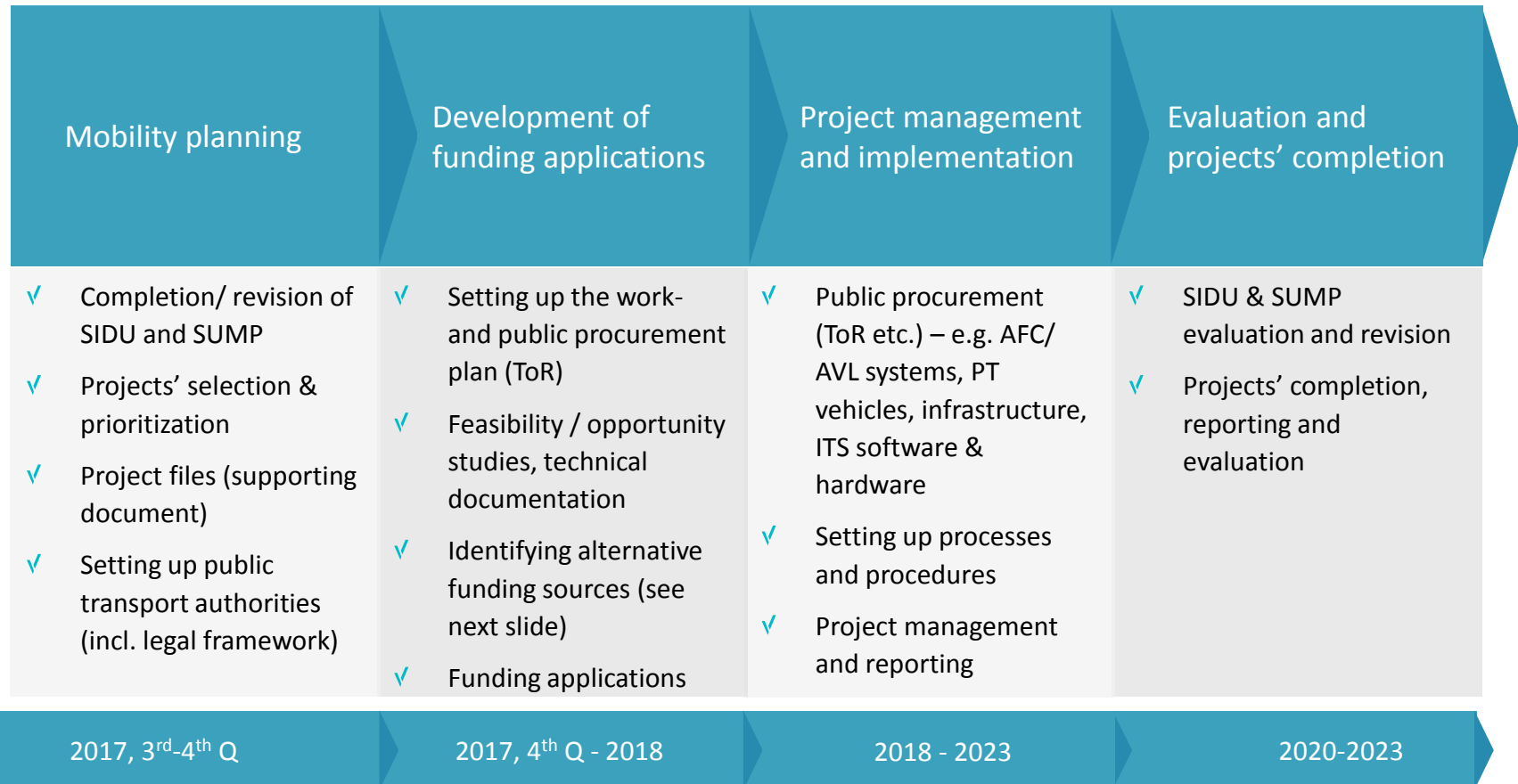
2nd stage



3rd stage



4th stage



Alternative mobility funding

Under the EU Cohesion Policy:

- European Structural and Investment Funds
- JASPERS
- INTERREG
- URBACT III
- Innovative actions in sustainable urban development

Under the European Investment Bank:

- Loans and guarantees
- ELENA
- JESSICA
- European Energy Efficiency Fund

Others:

- LIFE
- Connecting Europe Facility funds
- Horizon 2020
- European Fund for Strategic Investments
- Fuel Cell and Hydrogen Joint Undertaking for H2 mobility related projects

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