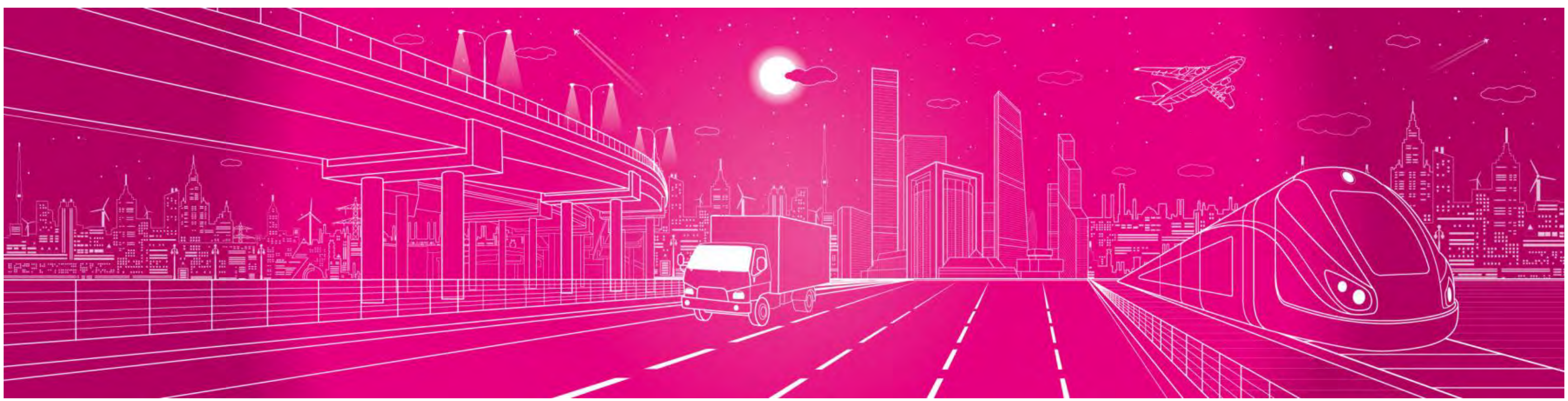
Massimo Marciani

June 26th, 2018

2018 International Symposium on Energy Efficiency

MAKING THE CASE FOR SUSTAINABLE MOBILITY IN ITALY AND EUROPE



SOLUTIONS FOR MOBILITY

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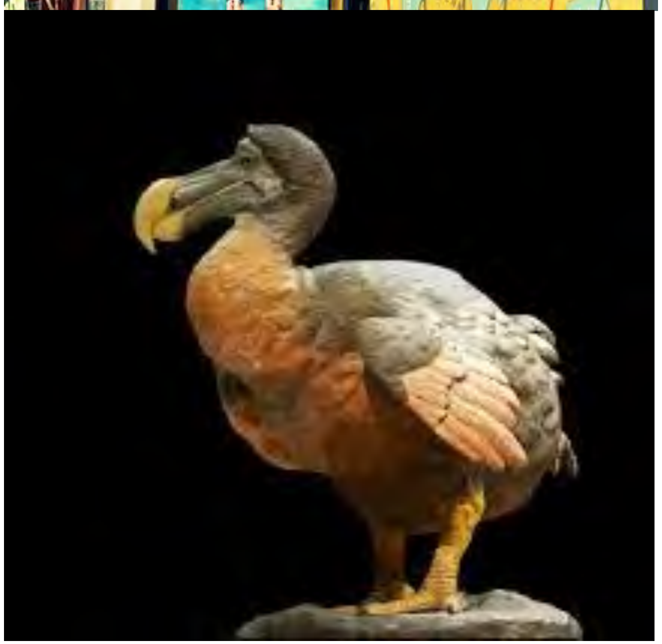
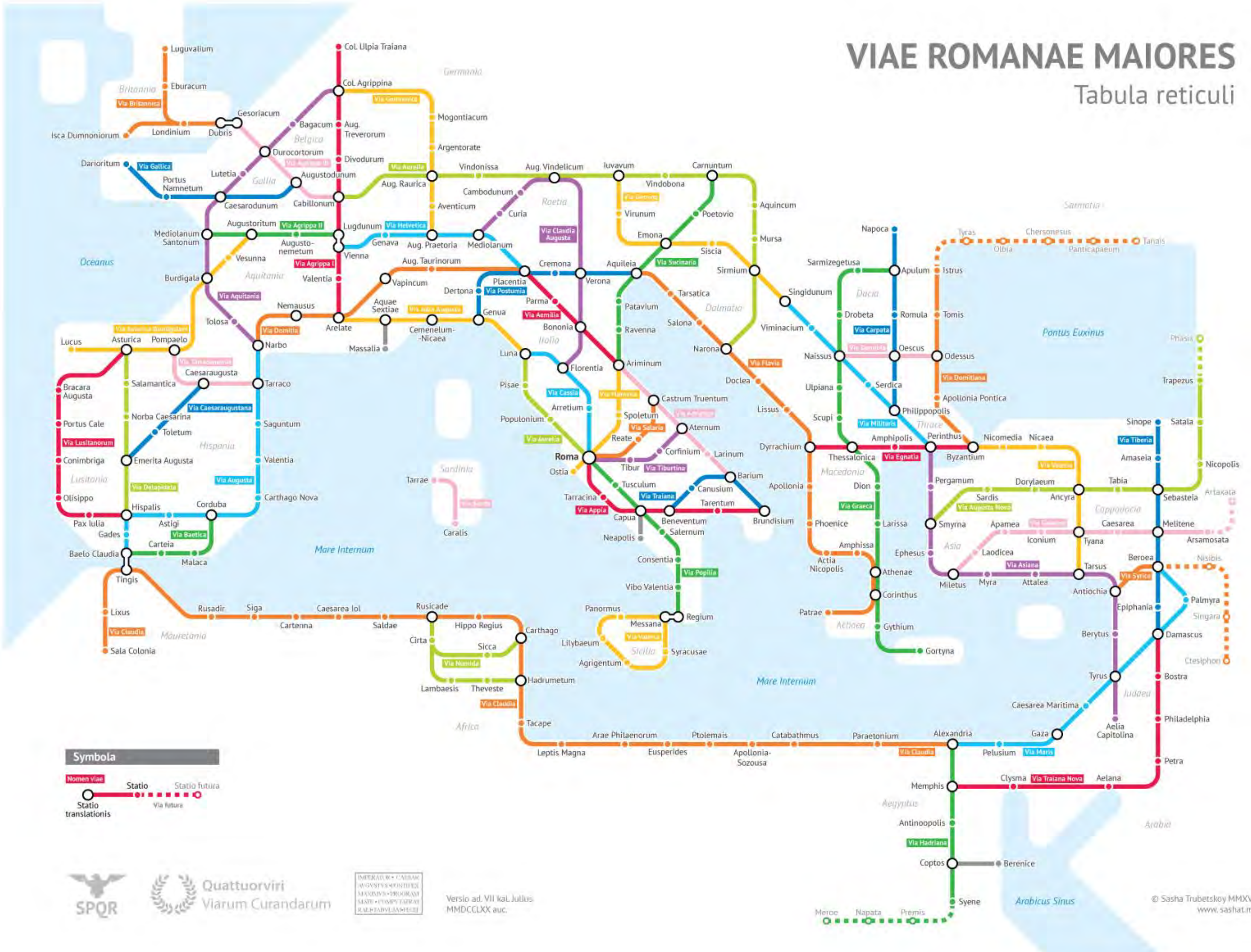


What they have in common?

Logistics in Rome 31 a.c.



Urban Logistics in Rome 2017 b.c.

COORDINATED DELIVERIES

OFF STREET PARKING

RESERVED PARKING LOT

DOOR-TO-DOOR DELIVERIES

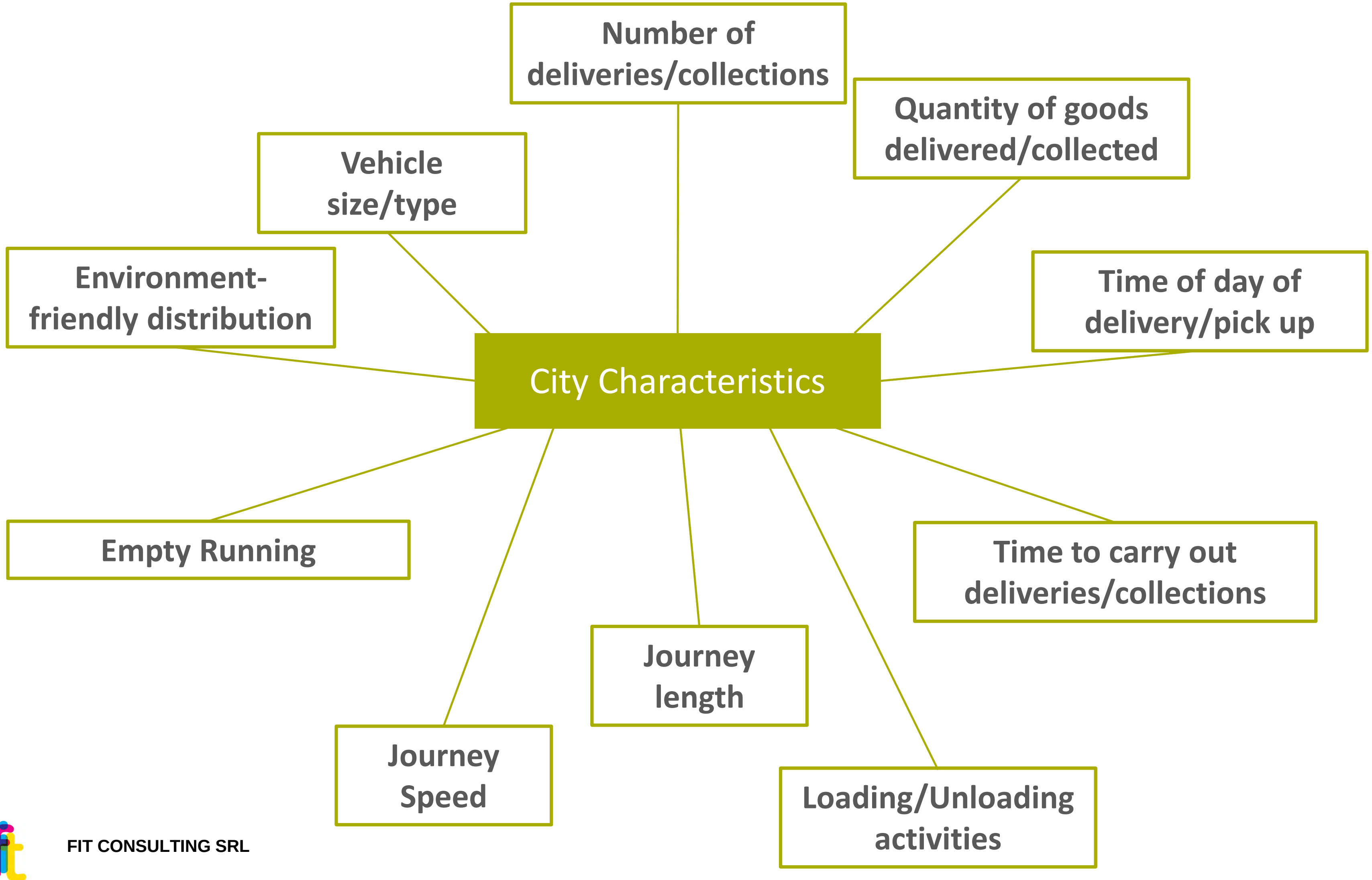
TRANSHIPMENT FACILITIES

We have a problem not only in Rome!

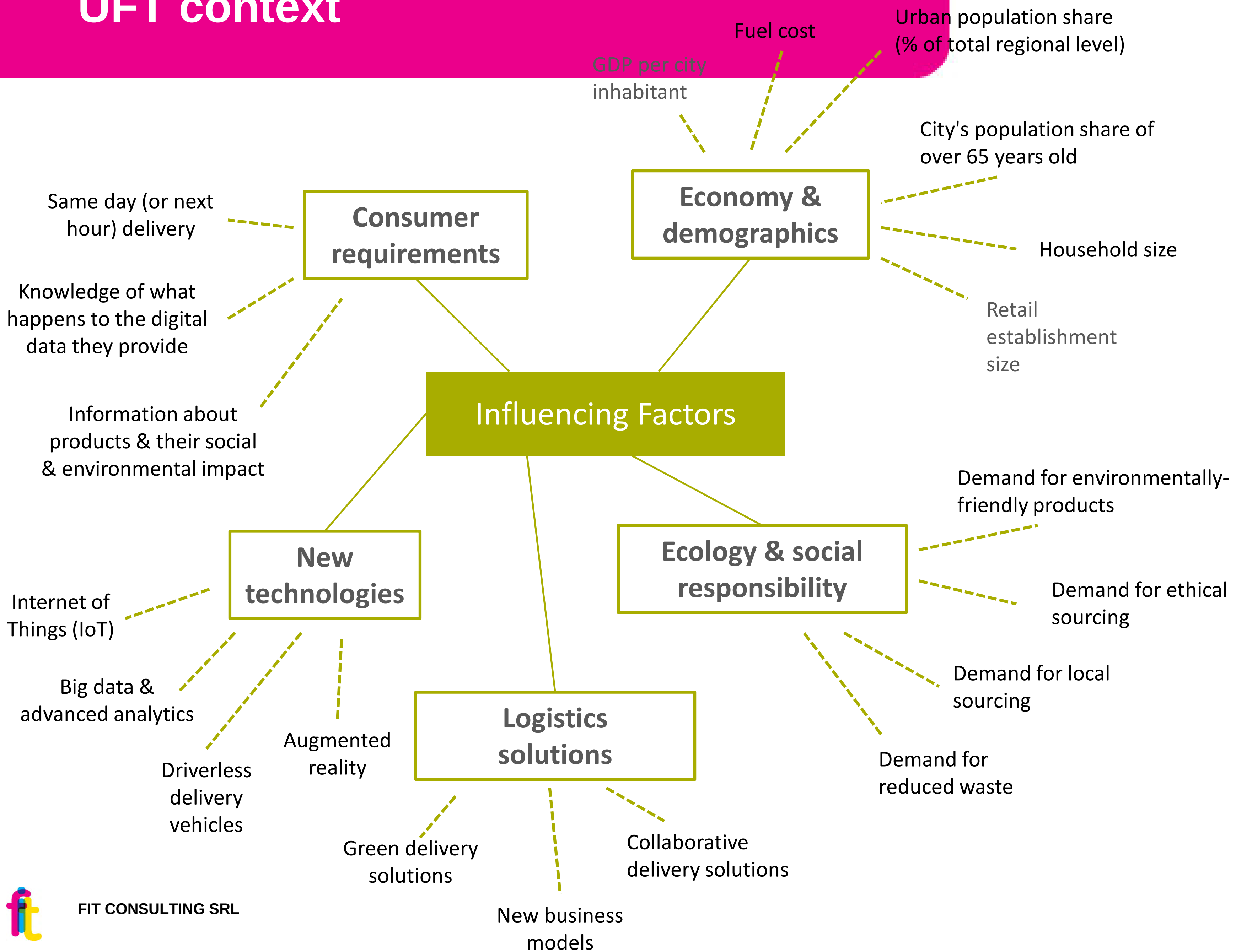
Urban Freight Traffic is an issue

1. contributes to urban challenges (20% of traffic, 40-50% of GHG)
2. embeds conflicts (space/time, econ./environm., stakeholder views)
3. highly context-specific & dynamic (urbanisation, e-commerce)
4. still heavily neglected in city/transport planning (restrict vs assist)

UFT context


Number of deliveries/collections
Quantity of goods delivered/collected
Vehicle size/type
Environment-friendly distribution
Time of day of delivery/pick up
City Characteristics
Empty Running
Time to carry out deliveries/collections
Journey length
Journey Speed
Loading/Unloading activities

UFT context



Influencing Factors
Consumer requirements
Same day (or next hour) delivery
Knowledge of what happens to the digital data they provide
Information about products & their social & environmental impact
Economy & demographics
GDP per city inhabitant
Fuel cost
Urban population share (% of total regional level)
City's population share of over 65 years old
Household size
Retail establishment size
New technologies
Internet of Things (IoT)
Big data & advanced analytics
Driverless delivery vehicles
Augmented reality
Logistics solutions
Green delivery solutions
New business models
Collaborative delivery solutions
Ecology & social responsibility
Demand for environmentally-friendly products
Demand for ethical sourcing
Demand for local sourcing
Demand for reduced waste

City of Turin

The Municipality of Turin has a population of 902,137. Population density ≈ 6,950 inhabitant /Km2

The motorization rate is approximately about 63% and overall trips on a working day are about 3,43 millions.

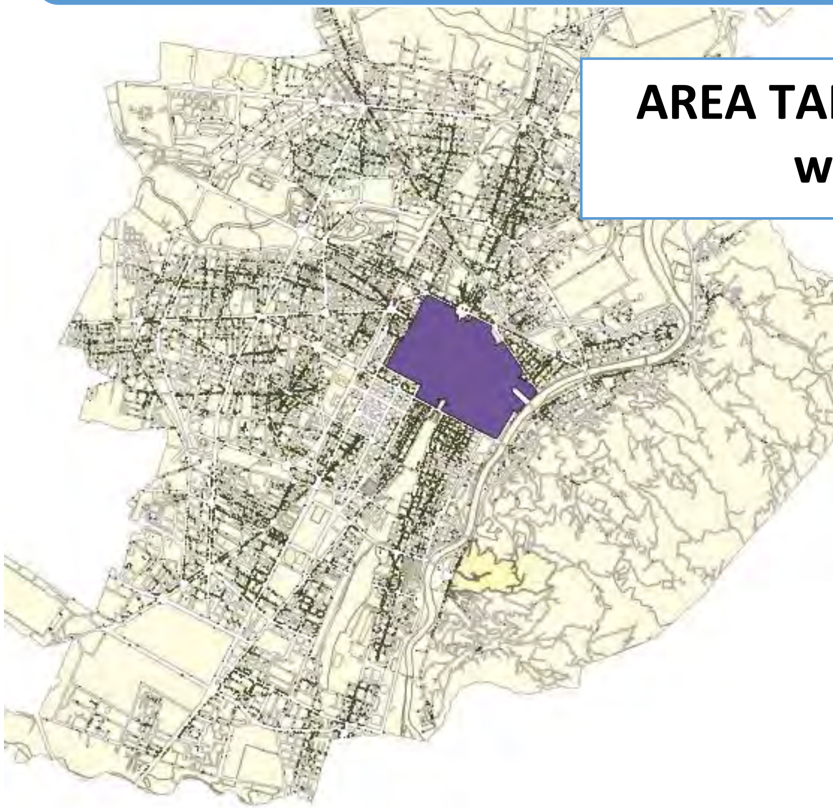
Trips per day per person are 2,44 (1,75 motorized).

Turin adopted a SUMP since 2008.

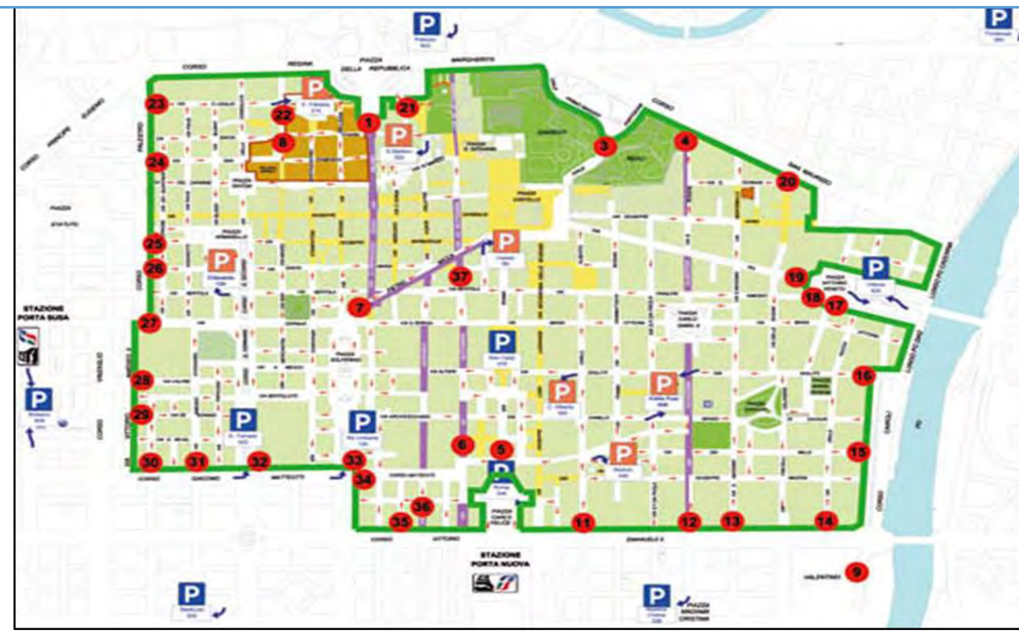
Turin is leading city in Italy in urban logistics having developed a set of push and pull measures dealing with restrictions and incentives for logistics operators delivering their operations in accordance with the Freight Quality Partnership (FQP) Agreement signed in 2013.

City of Turin

Analysis of the existing situation of urban freight transport in pilot area (Identification of existing criticalities)

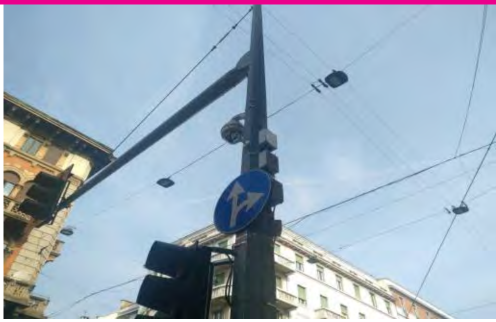


AREA TARGET → Central ZLT: 2,58 km² (infrastructured with 37 accesses monitored by cameras)



2,400 shops, restaurants, bars **6** pedestrian streets **4** reserved bus lanes

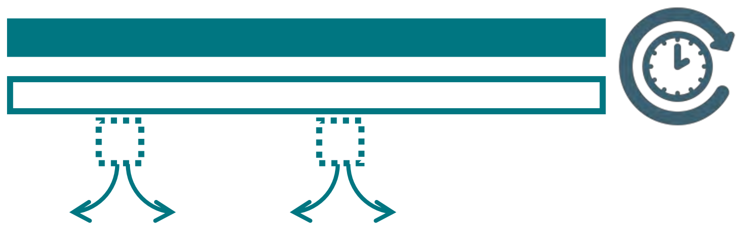
The Pilot Project in Turin



Sharing of public transport reserved lanes

Booking of loading/unloading docks

LTZ entrance



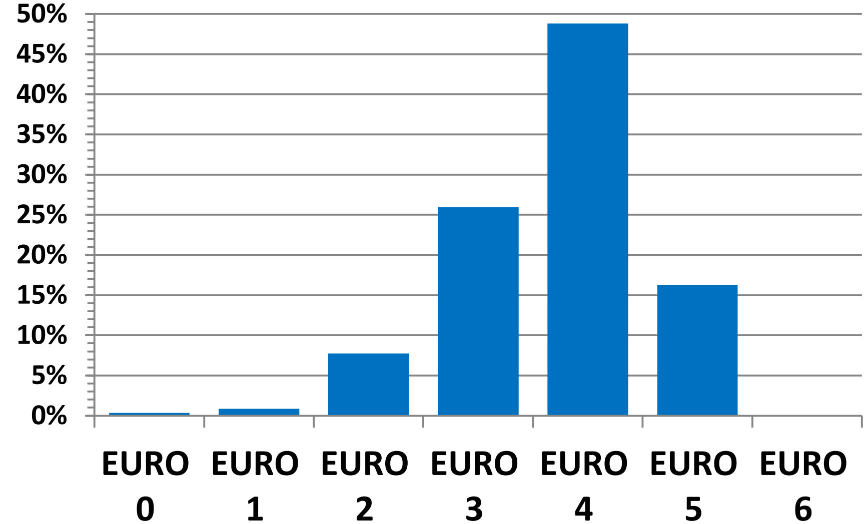
Passenger Transport

Freight Transport

Dynamic infrastructure sharing

Laboratory Target Area in a Nutshell

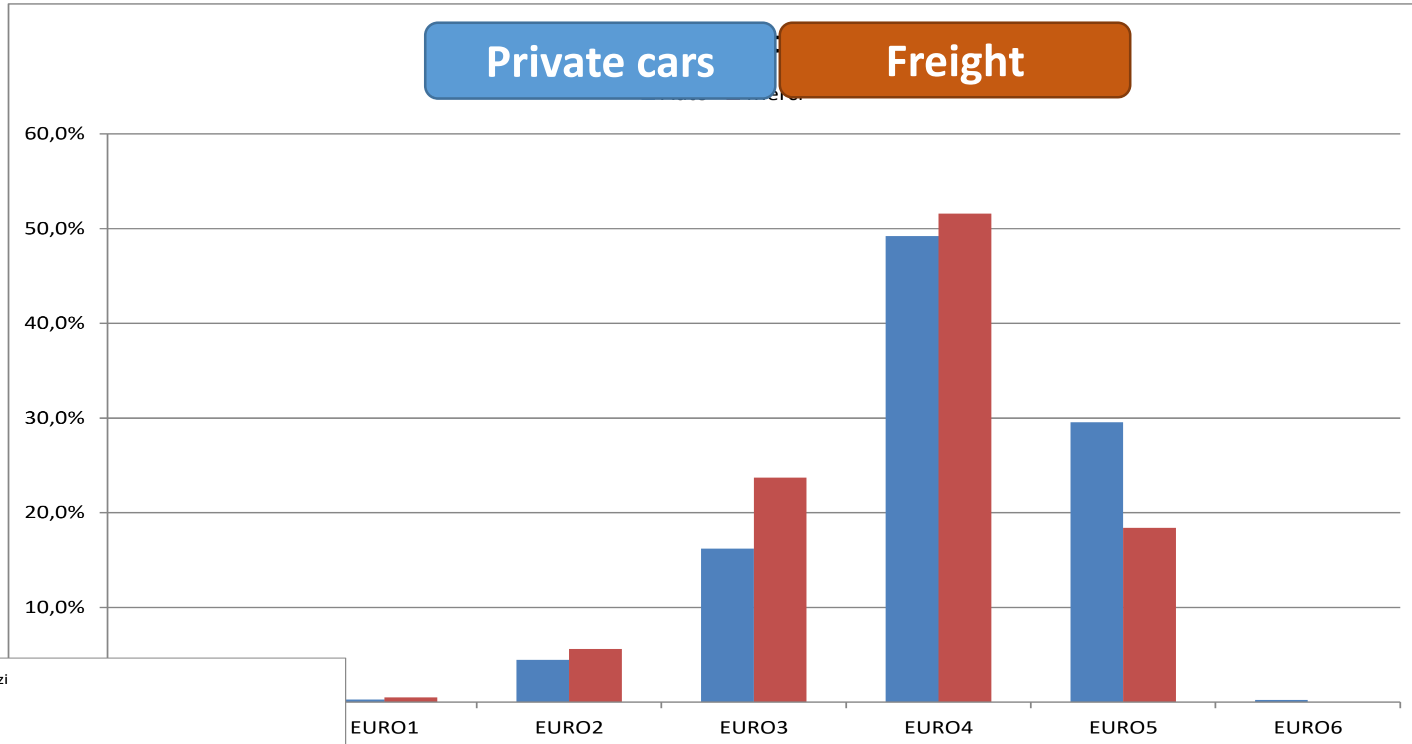
Demands of goods	Tons/day	%
Fresh food	30.3	8.3
Dry food	28.0	7.7
Groupage	100.9	27.8
Fashion goods	60.7	16.7
Hotel restaurant catering	143.3	39.5
TOTAL	363.2	100.0

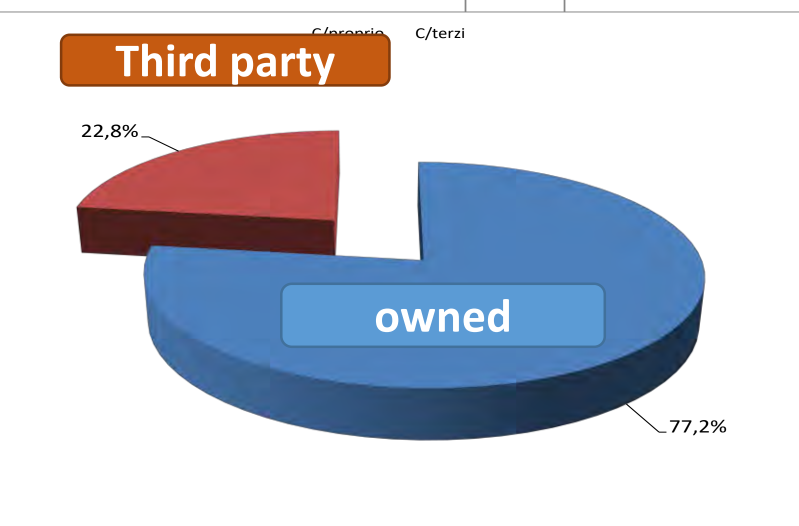


Category	Entrance in ZLT	Share
EURO 0	34	0,33%
EURO 1	91	0,88%
EURO 2	806	7,76%
EURO 3	2.698	25,97%
EURO 4	5.070	48,81%
EURO 5	1.687	16,24%
EURO 6	1	0,01%
Totale	10.387	100.00%

Vehicles entering in LTZ	%
Cars	88,7
LCVs	7,4
Buses	2,0
Motocycles	1,9

Urban Mobility and Logistics Professionals





The innovative access model

Logistics operators involved in the project receive a special permission that allow to:

- Access LTZs from 6.00 to 24.00
- Use dedicated bus lanes
- Use loading/unloading areas within pedestrian zones


CITTA' DI TORINO MERCI

NOVELOG

New cOoperatiVe business modEls and guidance for sustainable city LOGistics

PERMESSO MERCI

Ente o ditta:

N: Scade: 30/09/2016

Targa:

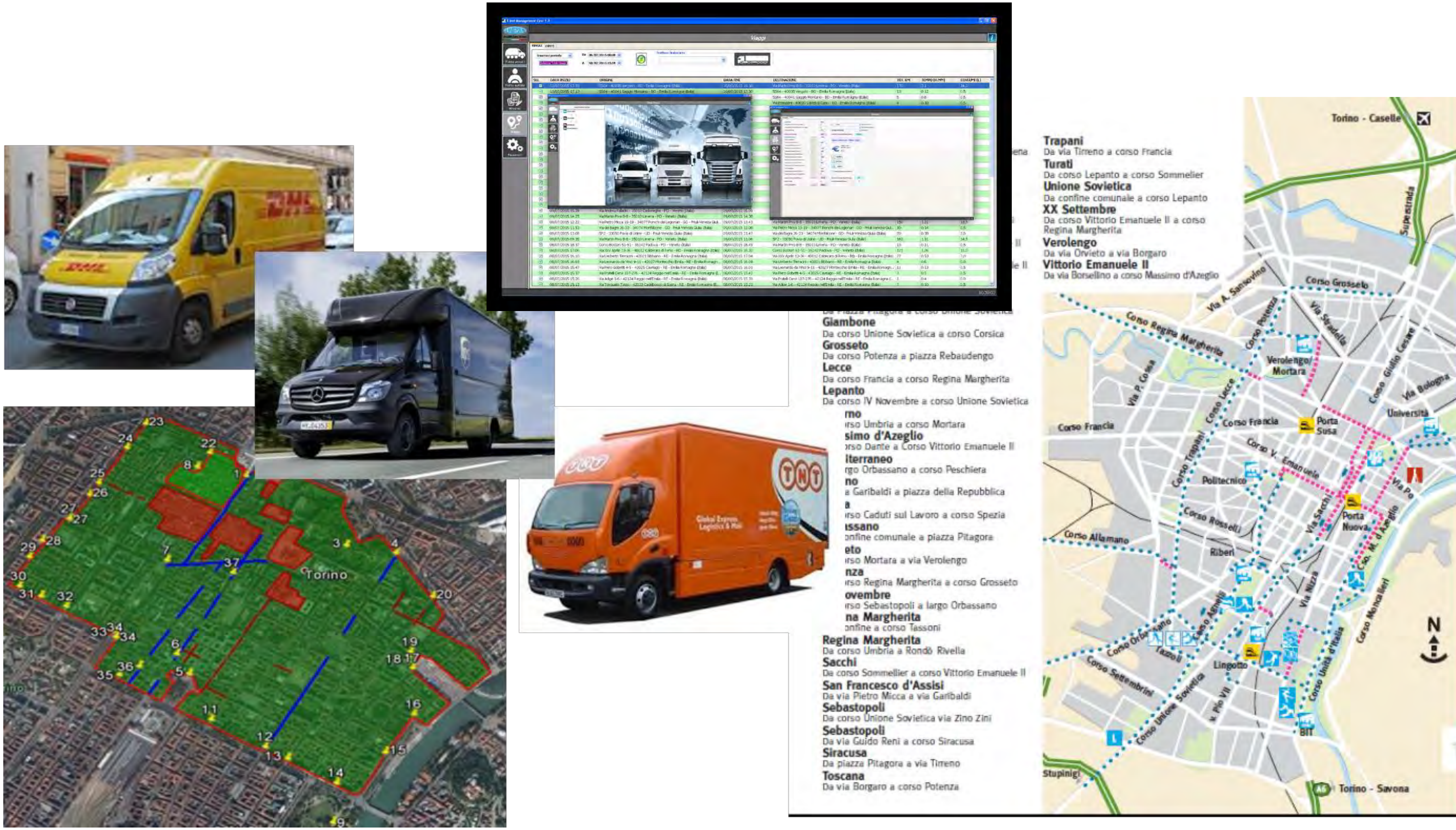
IL DIRIGENTE

Minimum requirements

Minimum requirements to join the recognition scheme are:

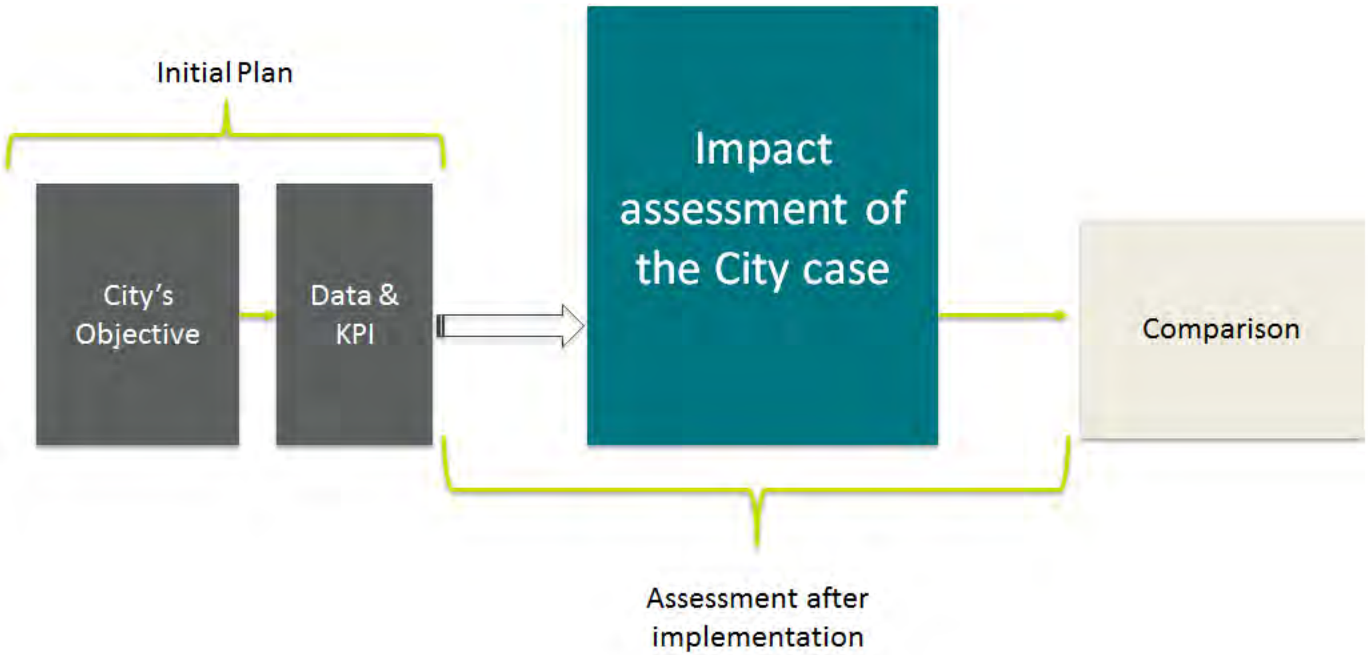
- Low Emission Vehicles compliant to Euro 5 standards or higher, with a gross vehicle weight below 3,5 tons (raised to 7 tons for ZEVs)
- Embedded electronic devices able to detect and transmit data regarding the location of the vehicle (i.e. GPS)

The pilot



DHL
Torino
Trapani
Da via Tirreno a corso Francia
Turati
Da corso Lepanto a corso Sommelier
Unione Sovietica
Da confine comunale a corso Lepanto
XX Settembre
Da corso Vittorio Emanuele II a corso Regina Margherita
Verolengo
Da via Orvieto a via Borgaro
Vittorio Emanuele II
Da via Borsellino a corso Massimo d'Azeglio
Giambone
Da corso Unione Sovietica a corso Corsica
Grosseto
Da corso Potenza a piazza Rebaudengo
Lecce
Da corso Francia a corso Regina Margherita
Lepanto
Da corso IV Novembre a corso Unione Sovietica
Regina Margherita
Da corso Umbria a Rondò Rivella
Sacchi
Da corso Sommelier a corso Vittorio Emanuele II
San Francesco d'Assisi
Da via Pietro Micca a via Garibaldi
Sebastopoli
Da corso Unione Sovietica via Zino Zini
Sebastopoli
Da via Guido Reni a corso Siracusa
Siracusa
Da piazza Pitagora a via Tirreno
Toscana
Da via Borgaro a corso Potenza
Torino - Caselle
Torino - Savona

The methodological approach



Impact assessment indicators

Impact area	Criterion	Composite Indicator	Indicator
Environment	Air quality		CO concentration
			SO_x concentration
			NO_x concentration
			VOC concentration
			NH_3 concentration
			PM_{10} concentration
	GHG emissions	GHGs	CO_2
			CH_4
			N_2O
	Noise pollution		Noise
Transport & Mobility	Level of service	Reliability	Punctuality
			Quantity
			Quality
			Market response
			Customer satisfaction
			Supply chain visibility
	Safety and security	Safety	Accidents
			Fatalities
			Injuries
			Damages
	Transport system	Congestion	Delays
		Space exploitation	Violations
	UFT vehicles		Traffic throughput
			Load factor
			Vehicle utilisation factor

Objectives and expected impacts

The expected impacts of Turin UFT are:

- Traffic reduction
- Vehicle utilisation factor reduction
- CO_2 emissions reduction
- Accidents reduction
- Energy consumption reduction

Impact assessment KPIs

Module	Impact Areas	Wish list of indicators
Impact assessment	Mobility	Customer satisfaction; Traffic throughput; Vehicle utilisation factor;
	Environment	CO_2 emissions
	Safety	Accidents; Violations

Data collected for KPIs

Module	Impact Area	KPI	Data collected	Comments
Seamless urban freight distribution in Turin				
Impact Assessment	Mobility	KPI 51 (Customer satisfaction)	Rate (Likert scale 1-5)	"Before" data no available
		KPI 61 (Traffic throughput)	• Number of shipments • Average distance of a drive	Average distance of a run was based on estimations
		KPI 63 (Vehicle utilisation factor)	• Number of load/unload stops • Average time of drive	The number of load/unload stops was based on estimations.
	Environment	KPI 43 (Total CO2 emissions)	Per type of vehicle: • distances traveled • fuel type • average emission produced	
	Safety	KPI 53 (Accidents)	• Number of accidents • Total veh-km	Data available from questionnaire survey to express couriers
		KPI 60 (Violations)	• Number vehicles performing illegal movements (e.g. illegal parking and / or access in LTZs) • Total number of movements	

Methods applied and KPIs

Module	Impact Area	KPI	IA Method applied	KPI data/units	KPI values (Before | After)		Impact
Impact Assessment	Mobility	KPI 51 (Customer satisfaction)	Questionnaire survey	Likert scale	2	4	Positive
		KPI 61 (Traffic throughput)	Average distance run x number of vehicle trips per day	Veh-km/day	107,8	98,2	Positive
		KPI 63 (Vehicle utilisation factor)	Number of load/unload stops per day x average time of drive	%	65,3	49	Positive
	Environment	KPI 43 (Total CO2 emissions)	CO2 emissions evaluated with mathematic formulas considering type of vehicle, distances, fuel type, average emission produced	kg	27,420	24,930	Positive
	Safety	KPI 53 (Accidents)	Questionnaire survey	Number / veh-km	4	0,5	Positive
		KPI 60 (Violations)	Questionnaire survey	%	10	0	Positive

Some outcomes from pilot

The results achieved by this pilot case are very positive since all of the impact area's objectives were fully reached and most of them manage to overcome the initial targets.

The innovative aspect of this project is to plan transport with a holistic view: shared lanes for both passengers and freights.

Reserved loading/unloading parking facilitated couriers in deliveries. This system was managed by access control with already installed cameras that was further enhanced for the monitoring parking booking.

ITS helped couriers in deliveries by improving efficiency.

Some outcomes from pilot

Operators agree to improve their freight vehicles quality in favor of new and more eco-friendly ones in change of more flexibility in the use of bus lanes and access into the LTZ. T

The implemented measures allow environmental improvements: reduction of CO_2, pollutant emissions and traffic (no queue at the LTZ gates to wait for the entry time window, freight vehicles allowed to use bus lanes without reduce the bus commercial speed).

These measures fostered a more sustainable business model.

Comparison with the initial Objectives & Data Gaps

Mobility focuses

The traffic throughput witnessed a 9% decrease, vehicle utilisation also decreased about 25%, thus significantly overcoming the initial target (8%).

This aspect can be explained as an effect of the shared lanes used by both public transport and couriers by improving the efficiency of the whole transport system.

Finally, the customer satisfaction after the pilot reached a very satisfying score (4 in a scale from 1 to 5). Since no "before" data were available, though, comparison is not possible. Despite this, the shared lanes usage, loading/unloading parking, and flexible access into LTZ and on board unit installation seems to be widely appreciated among logistic operators.

Comparison with the initial Objectives & Data Gaps

Environmental focuses

Carbon dioxide witnessed an important decrease around 9%, however not reaching the initial target of 20%. This could be explained under the hypothesis that freight vehicles represent a small percentage of the total circulating vehicles.

Nonetheless, both the Municipality and stakeholders have appreciated the positive impact of the pilot case, since this indicates that significant environmental benefits can be highly achieved under holistic approaches, similar to the one implemented in this pilot.

Comparison with the initial Objectives & Data Gaps

Safety focuses

Significant positive impacts in terms of accidents and violations are also justified. The number of accidents during this pilot decreased by approximately 88% (significantly overcoming the initial target of 2% reduction). Furthermore, no violation was present after the pilot project.

The “before” situation of violations occurred probably due to the fact that freight vehicles were circulating in reserved lanes (shared with the public transport).

The zero value in the “after” situation can be probably explained due to the OBU installation, which provided warnings if the vehicle moves illegally or indicates available loading/unloading parking, thus avoiding illegal stops.

Conclusions

In order to summarise the main outcomes, it can be evidenced the following:

- The impacts of freight movement to/within cities suggest that city logistics should be a key priority for their evolving transportation networks.
- Logistics needs and requirements are rather different from town to town due to specific local characteristics, including the size of the city, the dimension and structure of the city centre, the existence of specific facilities, the urban road network, as well as the shops and products.
- It is not possible to identify a “one for all” solution, but it is essential to define several options based on the specific features of the town, as well as characteristics and needs identified.
- There is a growing consensus on the idea that more sustainable urban freight operations and significant benefits in terms of energy efficiency can be achieved by an appropriate mix of different measures.

Recommendations

- Build strong relationships between involved stakeholders
- Organise meetings to define regulations together with stakeholders through a cooperative process to ensure acceptance among carriers and other stakeholders
- Provide initial funding and assistance to potential participants of the freight schemes.

#ISEE18

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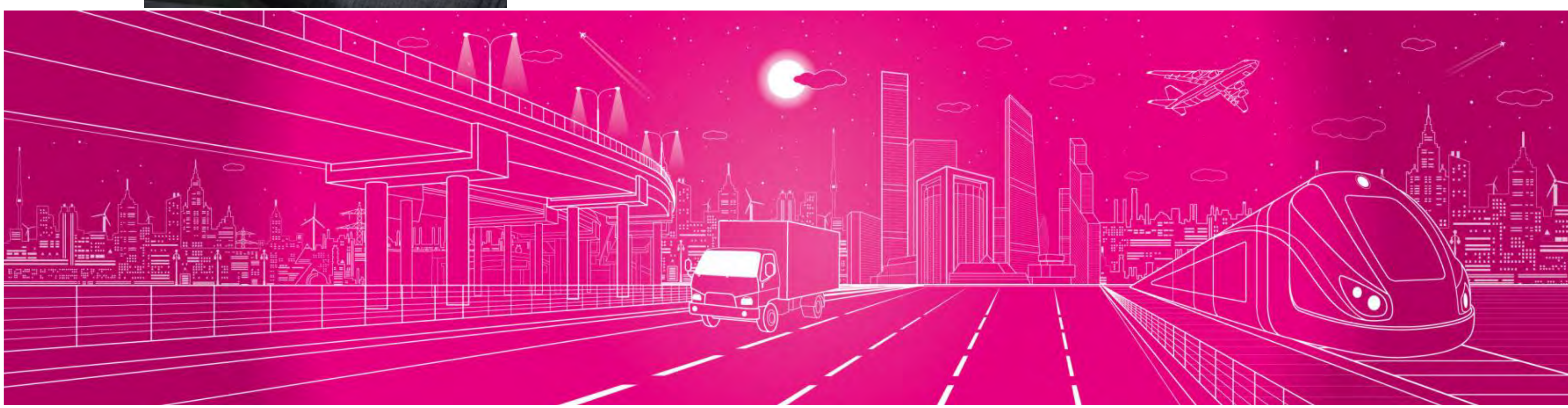

grazie.