



# Sustainable Mobility and Logistics in Urban Areas

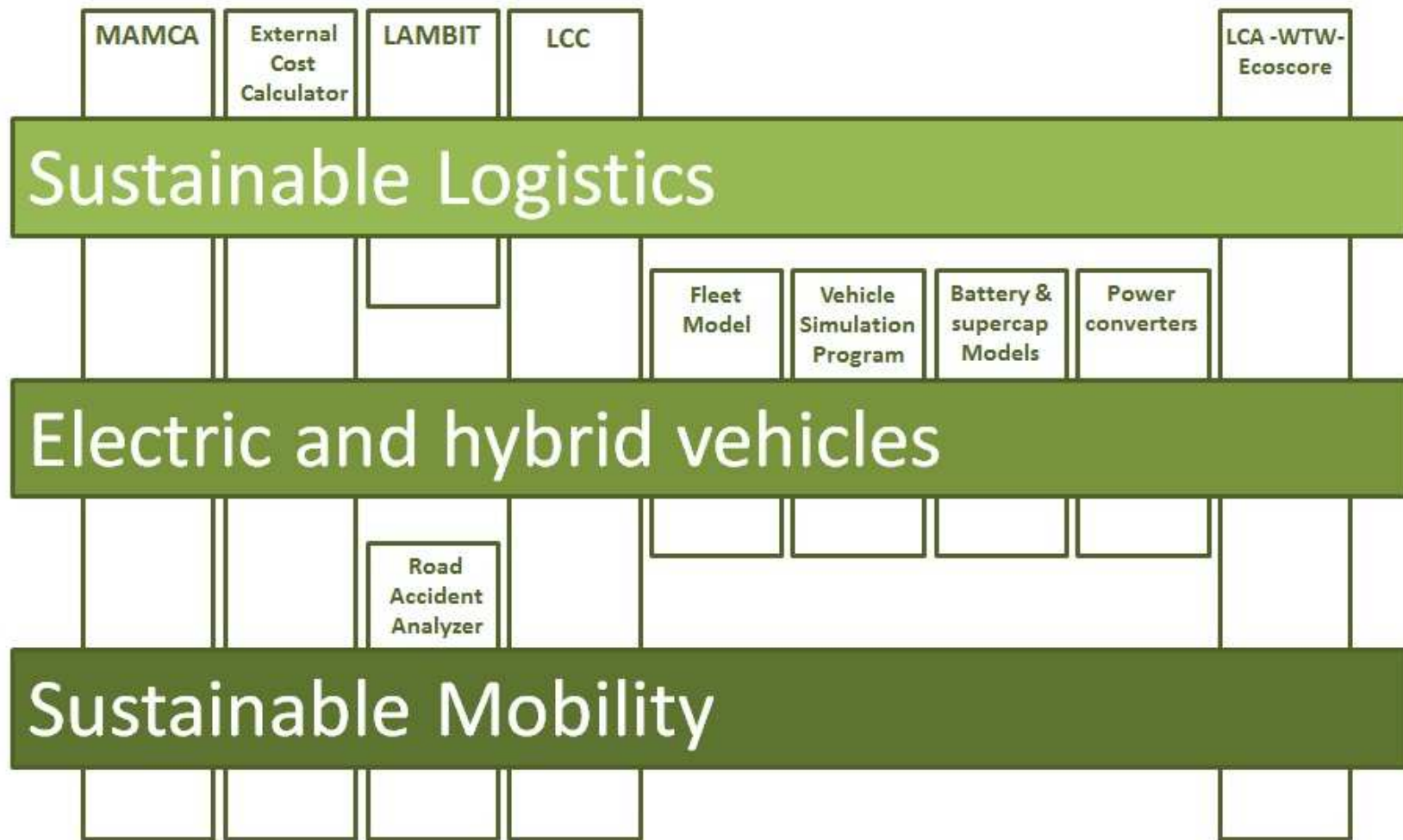
Prof. Dr. Cathy Macharis  
MOBI



Vrije Universiteit Brussel  
MOSI Transport & Logistiek



# MOBI: themes and tools



Growth  
Efficiency  
Employment  
Competivity  
Choice

### **Economy**

### **Society**

Safety  
Health  
Accessibility  
Equity

Sustainable  
Logistics  
and  
Mobility

### **Environment**

Climate change  
Air quality  
Noise  
Land use  
Biodiversity  
Waste

# 4 A's of sustainable mobility

## Awareness



## Act and shift



## Avoidance



## Anticipation



# Sustainable City Distribution

**Rush and  
land use in  
town**



**Insecurity in  
traffic, or  
external security  
(hazardous  
substances)**



Logistics is a condition for economic activity, but it also causes nuisance

**Congestion**



**Emissions, bad  
smell, noise for  
residents**



# 4 A's of sustainable city distribution

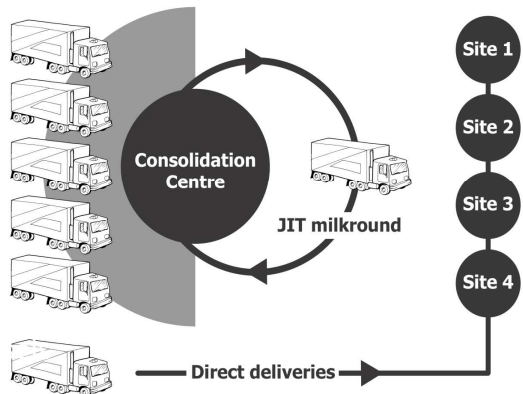
## Awareness



## Act and shift



## Avoidance



## Anticipation



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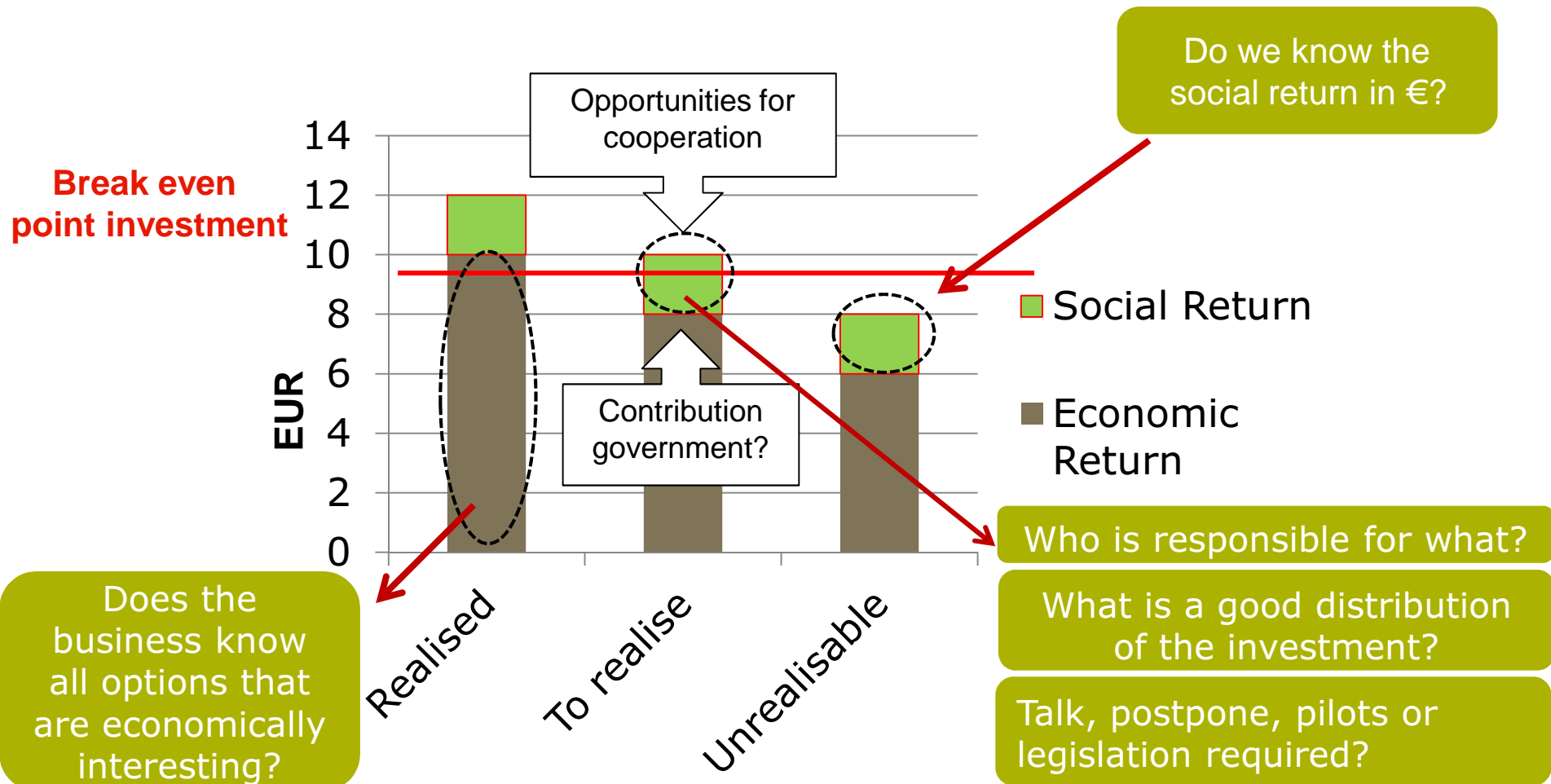
# 1° Awareness



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# Sustainable city distribution: Act?

Seems simple, but ...



Naar Scheffer et al., 2007



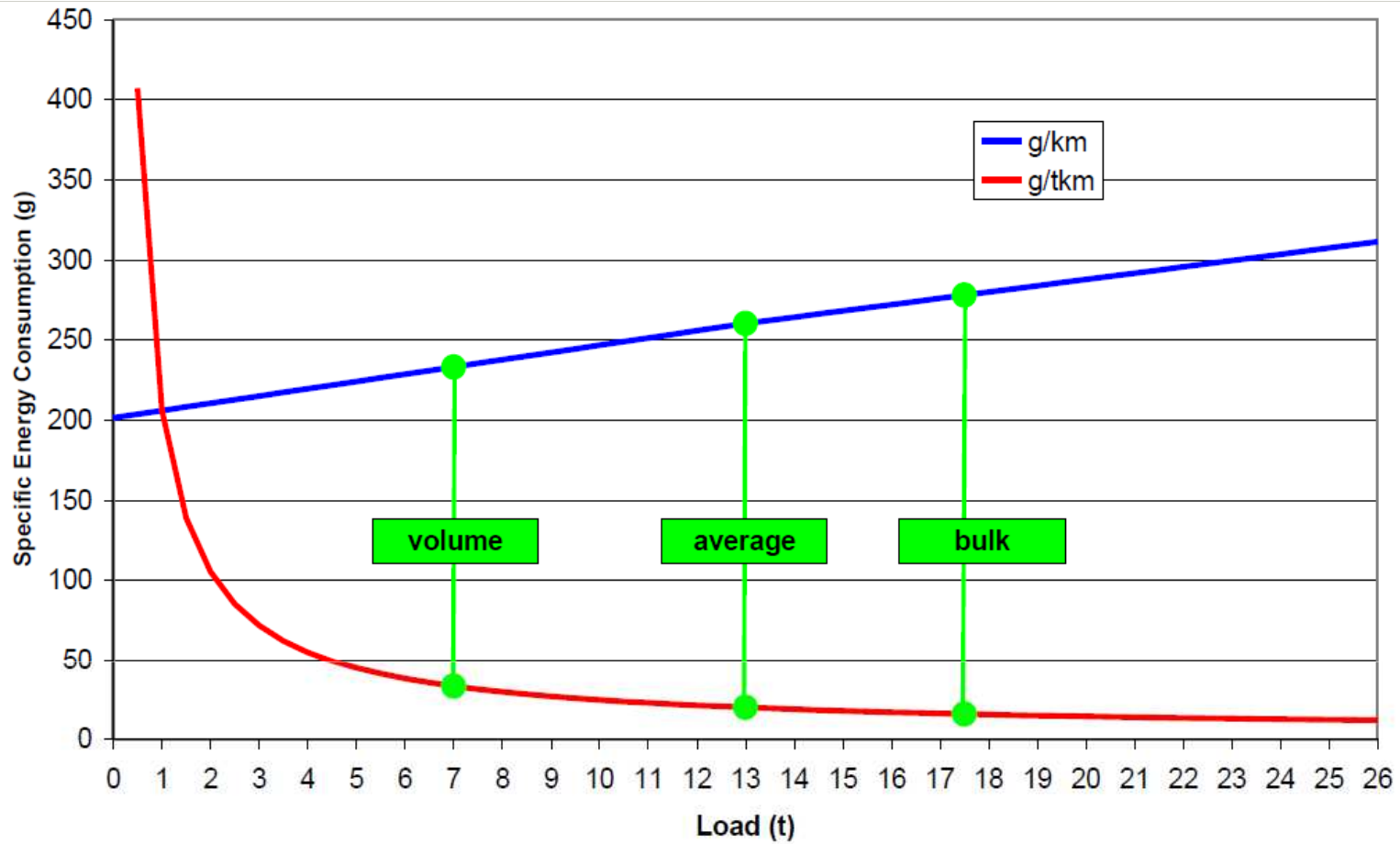


van Lier & Macharis, 2010

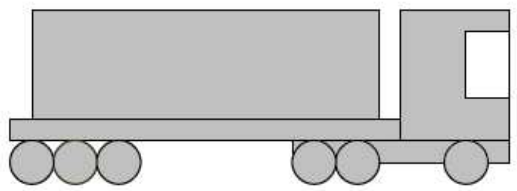
# 2° Avoidance



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ECF<sub>empty</sub>  
CU = 0%

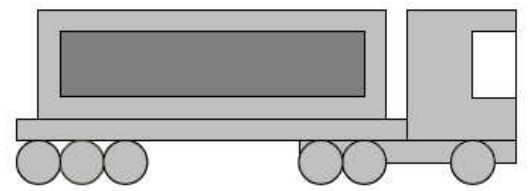


**Definitions:**

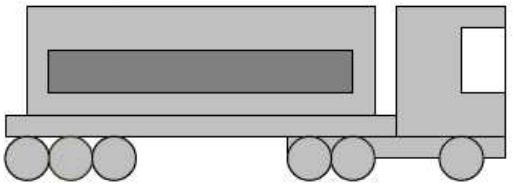
ECF	Final energy consumption with actual load (g/km)
ECF <sub>empty</sub>	Final energy consumption without load (g/km)
ECF <sub>full</sub>	Final energy consumption with full load (g/km)
M	Mass of freight (t)
CP	Payload capacity (t)
CU	Capacity utilisation (weight load / load capacity)

Remark: Load for volume/average/bulk goods including empty trips  
Source: Handbook Emission Factors for Road Transport 3.1 (INFRAS 2010)

ECF<sub>full</sub>  
CU = 100%



ECF  
CU = M / CP



Empty trucks

$$ECF = ECF_{empty} + (ECF_{full} - ECF_{empty}) * CU$$

# SC cooperation

## Vertical Collaboration

External  
(Suppliers)

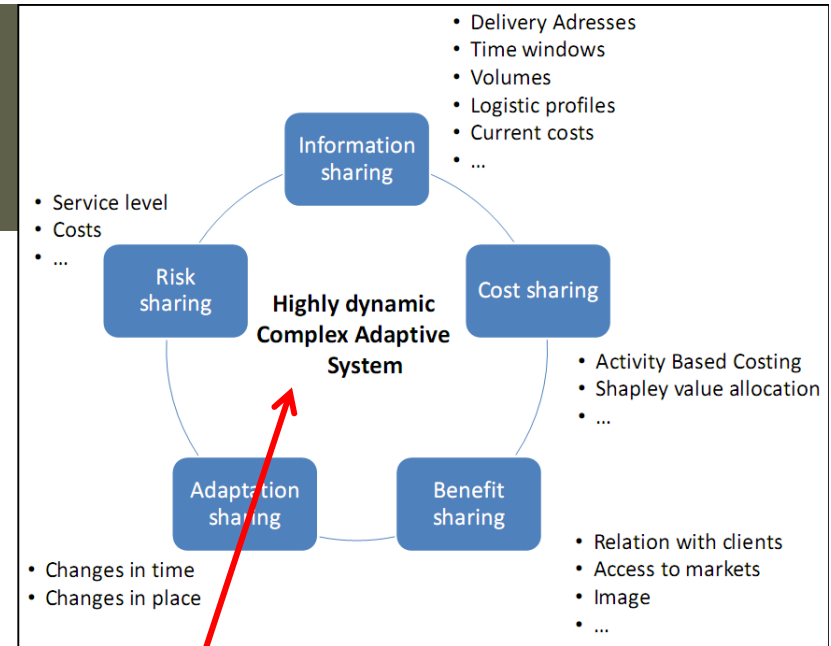
External  
(other  
organisations)

Internal

External  
(Competitors)

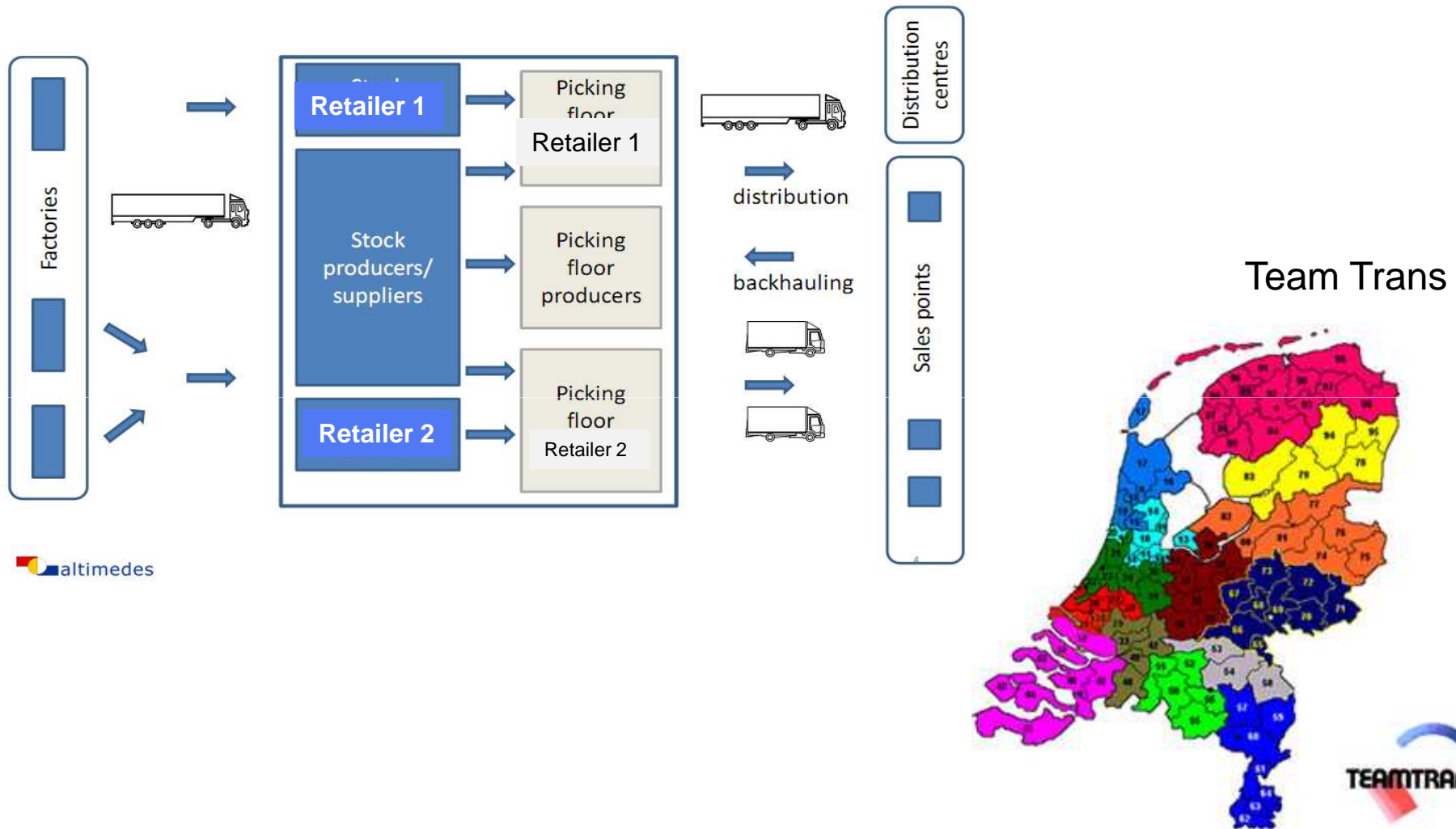
## Horizontal Collaboration

External  
(Clients)

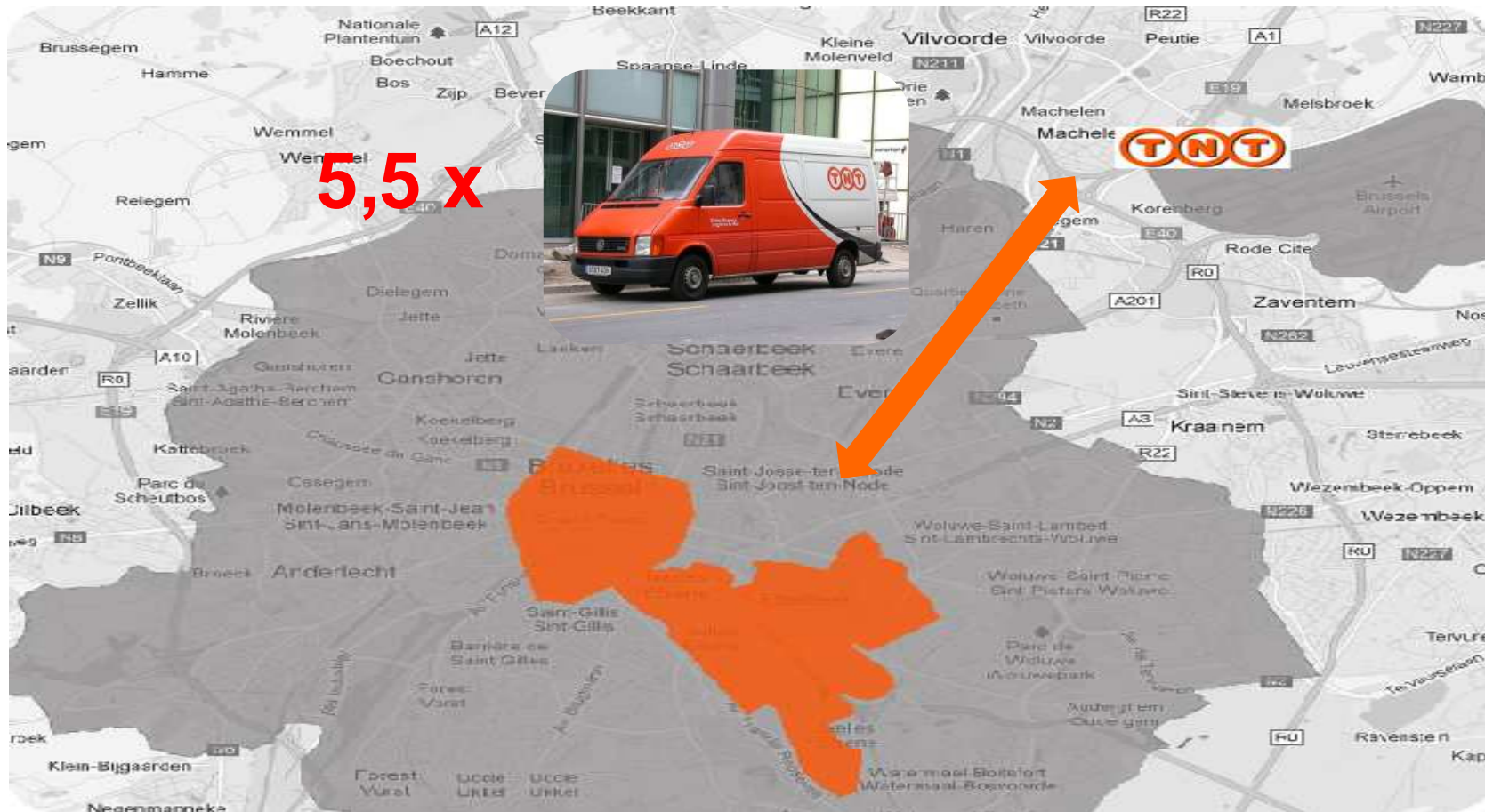


(Source: Altimedex Consulting)

# BUT success is possible



# TNT-Brussels



# Mobile depot



# 3° Acting : shift to other modes or to other hours



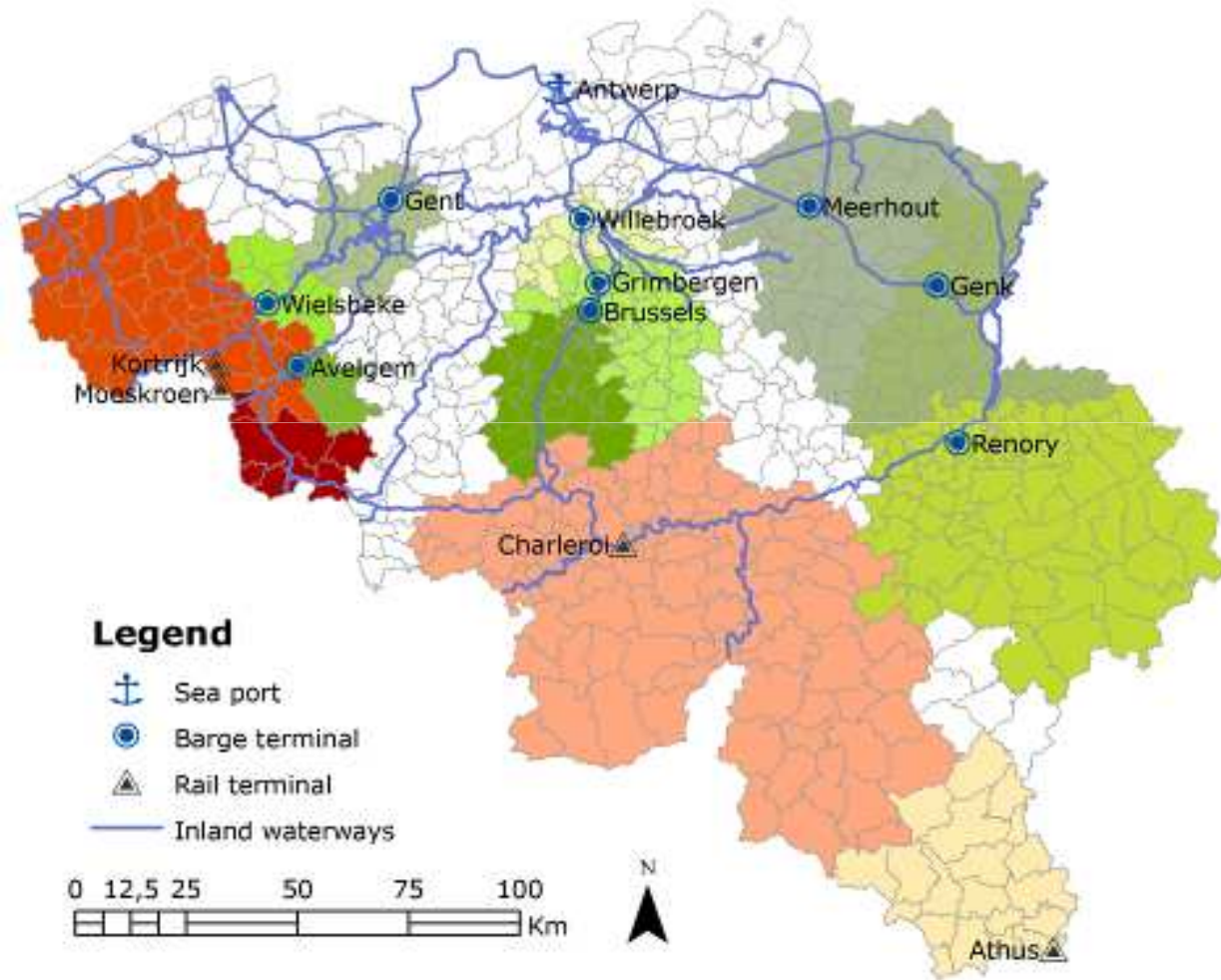
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# City barge transport

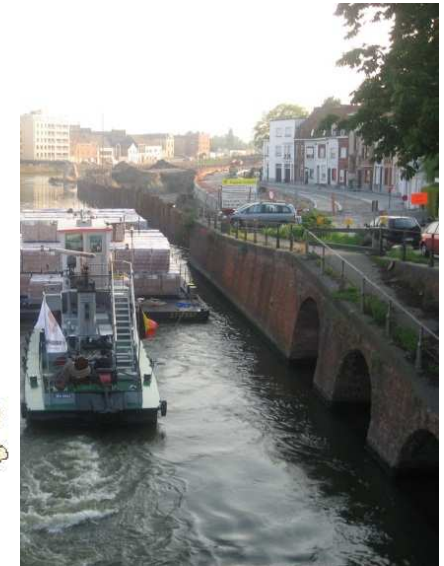
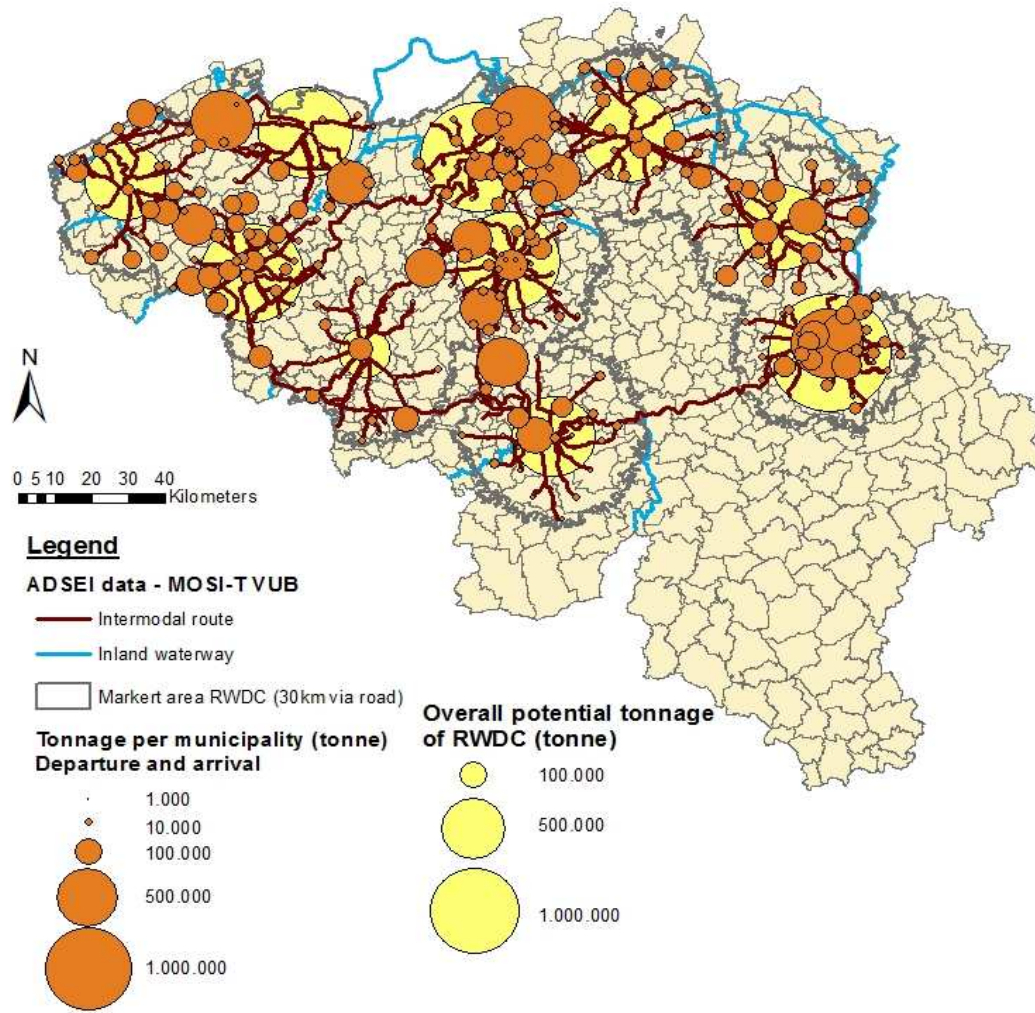


# Market area of intermodal terminals



MOSI-T, 2010

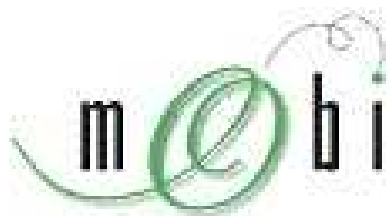
# Pallets on the waterway



# Night distribution



# 4<sup>o</sup> Anticipate new technologies



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# Natural gas



# Electric vehicles

**alkè**  
high performance utility vehicles



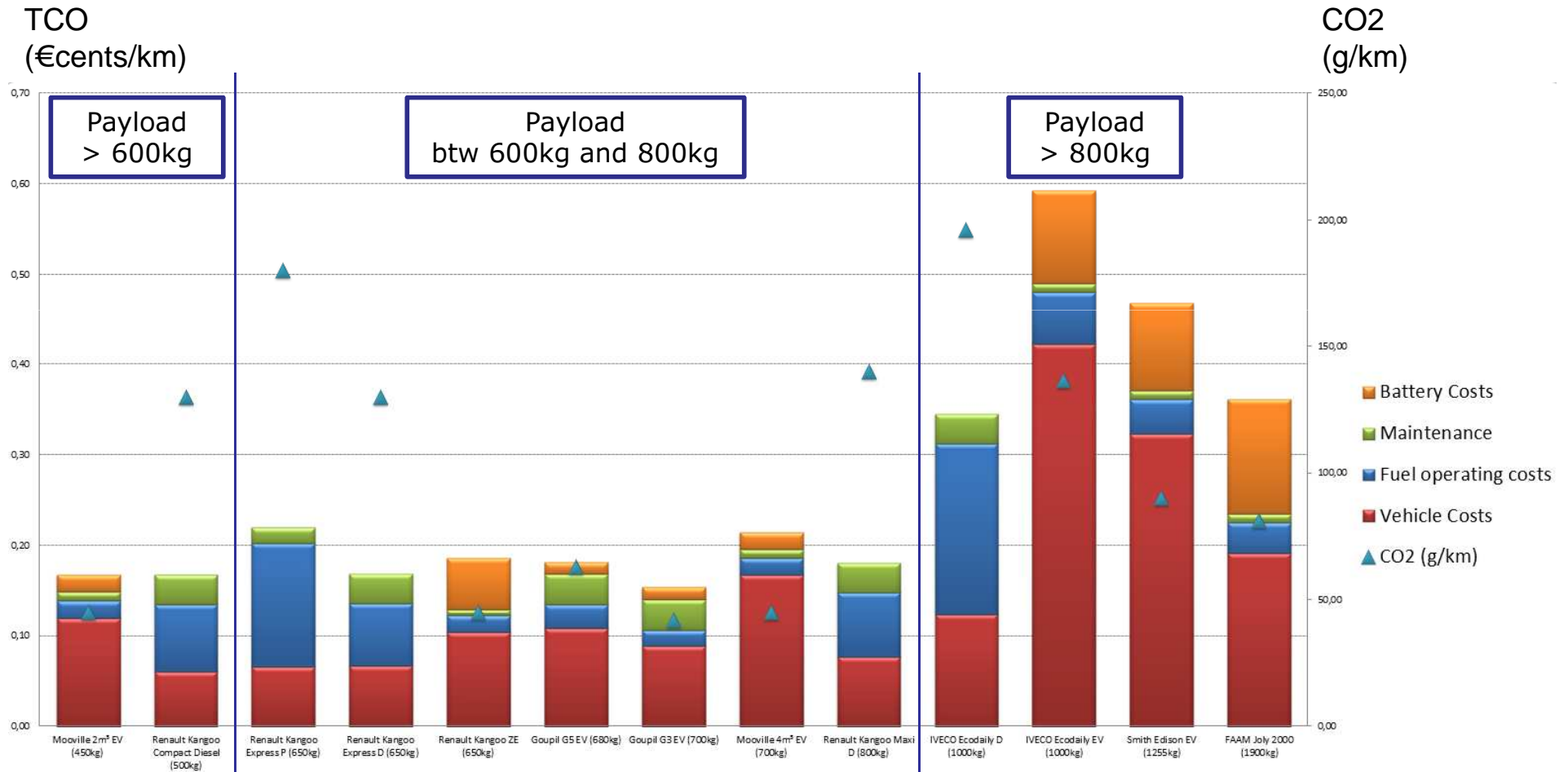
RENAULT  
**Z.E.**



**IVECO**



# TCO Analysis





# The well known OEM's are coming...



Mercedes-Benz



# Possible solutions

- Awareness!
- Avoid!
- Act!
- Anticipate!
- But several implementations fail...

# Why do urban distribution solutions tend to fail?



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# Actors involved

Shipper

Receiver

LSP

LSP employees

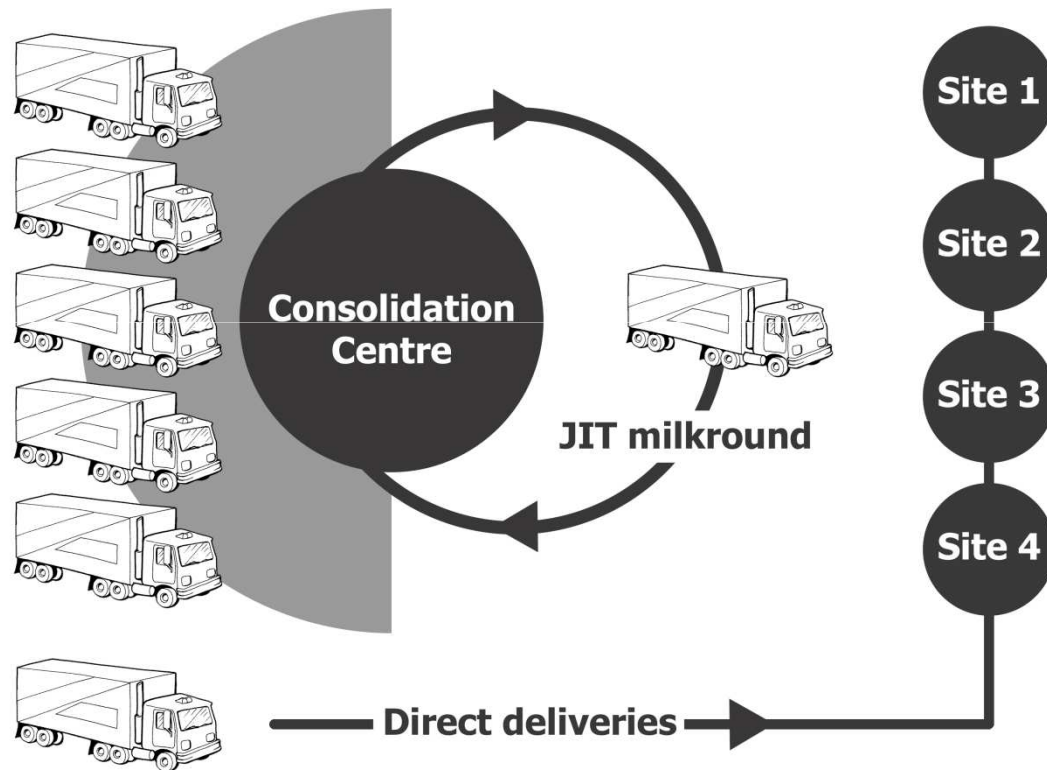
Authorities

Citizens

# Why it fails



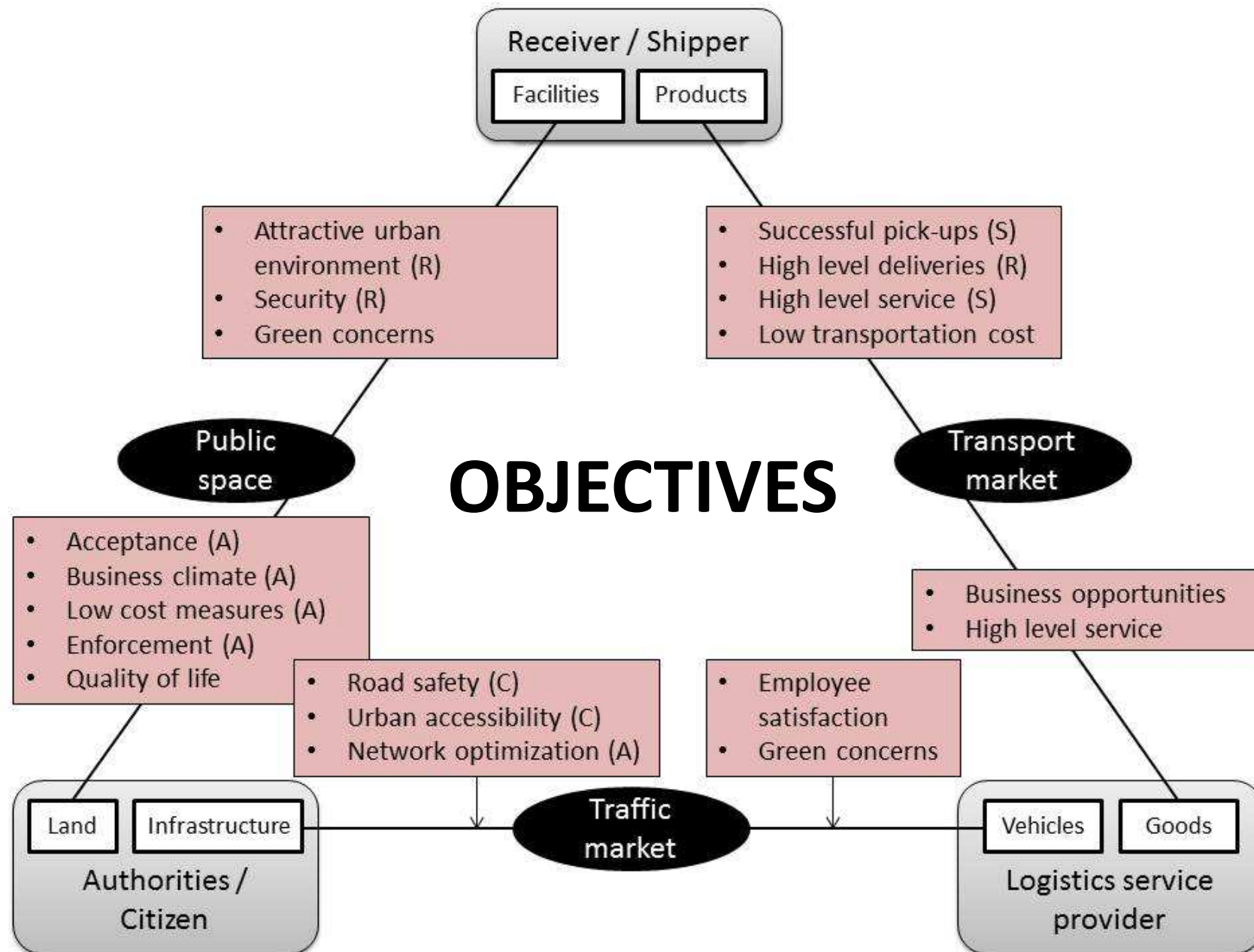
# Why it fails



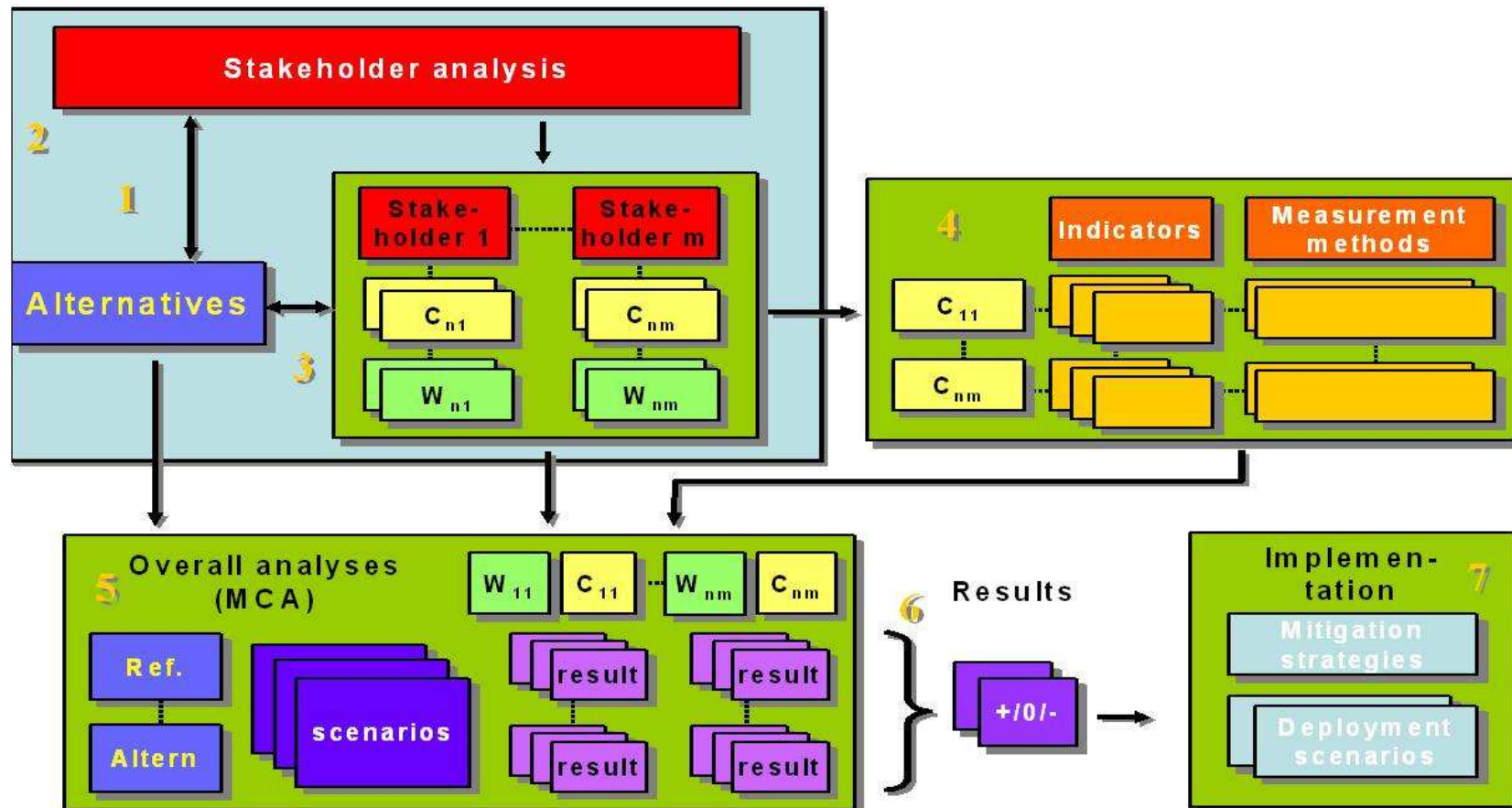
The list is long:

- Leiden
- Malaga
- Nuremberg
- Utrecht

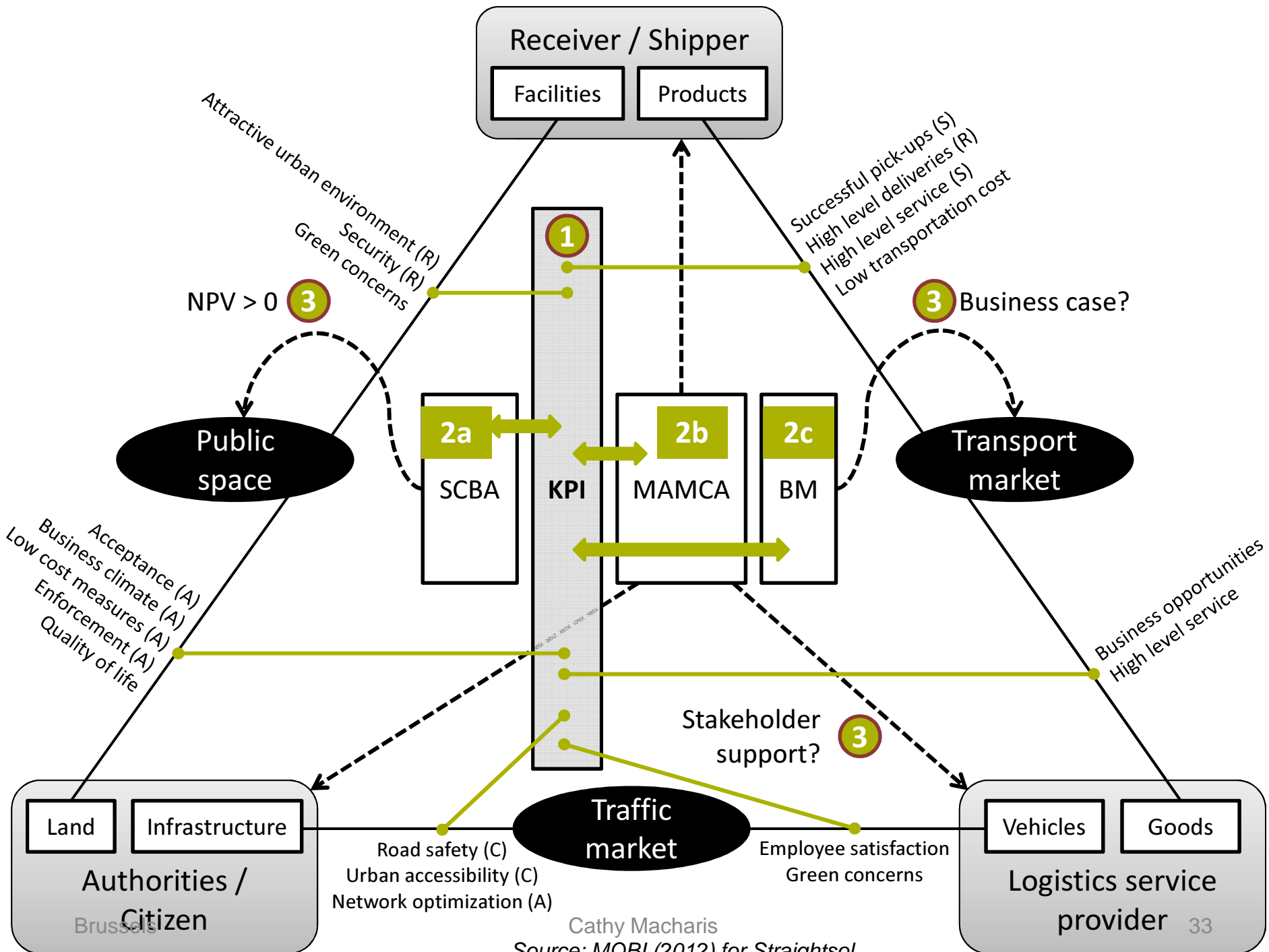
....



# Multi Actor Multi Criteria Analysis MAMCA (*Macharis, 2004*)







Cathy Macharis  
 Source: MOBI (2012) for Straightsol

# Conclusion

- ❑ Sustainable city distribution and mobility is possible:
  - ❑ Awareness
  - ❑ Avoid
  - ❑ Act
  - ❑ Anticipate
- ❑ Take into account the multi-actor setting of a city!

Thank you for your attention!

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