




**Université libre de Bruxelles**
**Brussels, Belgium**
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# PROMETHEE within the MAMCA methodology to evaluate the Mobile Depot Demonstration in Brussels

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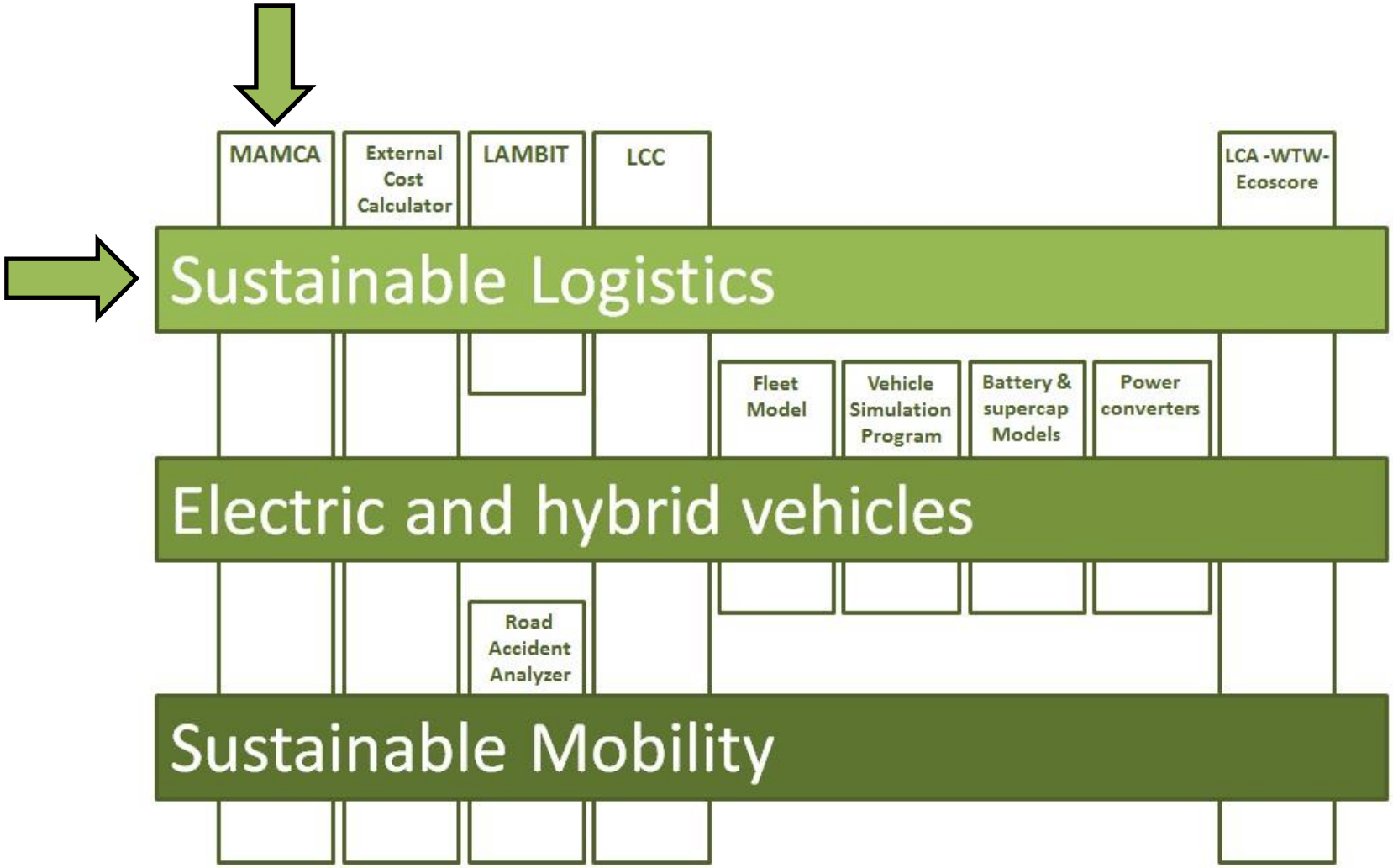
Vrije Universiteit Brussel

## 2nd International MCDA Workshop on PROMETHEE: Research and Case Studies

# MOBI teams and tools



# Overview

- Context
  - City distribution and its problems
  - Different stakeholders
  - STRAIGHTSOL
  - Mobile Depot demonstration in Brussels
- Evaluation framework
- MAMCA and the use of PROMETHEE
- Results
- Conclusion

# City Distribution

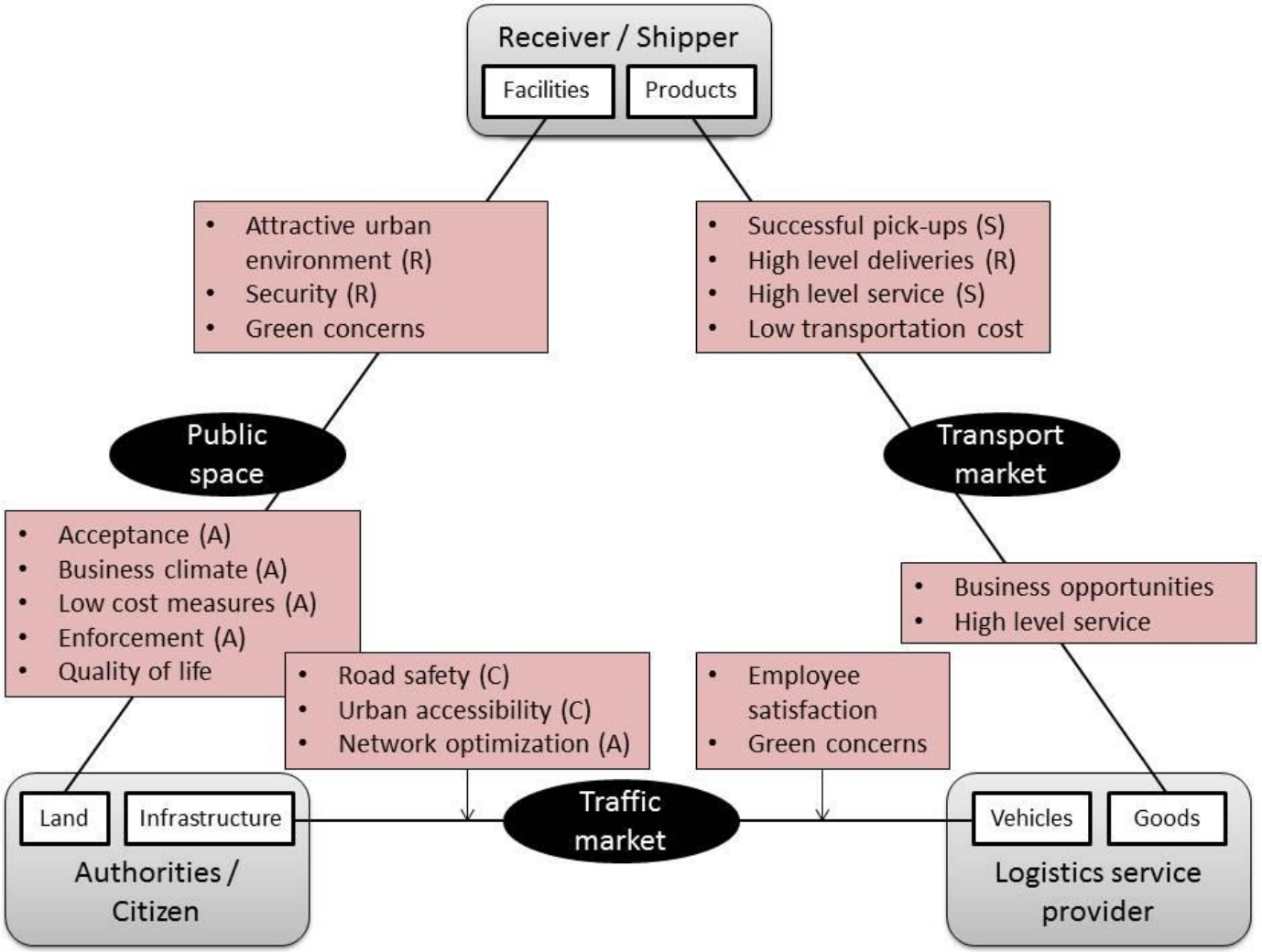
Logistics is a requirement for economic activity and a viable city

# Challenges for the transport sector




# Sustainable city distribution?

# Stakeholders




Source:adapted from Söncke (2011)

# STRAIGHTSOL

*Strategies and measures for smarter urban freight solutions*

# Mobile Depot





# Set-up demonstration




Mobile Depot instead of multiple diesel vans

Central parking location for MD

4 cyclocargos for last-mile

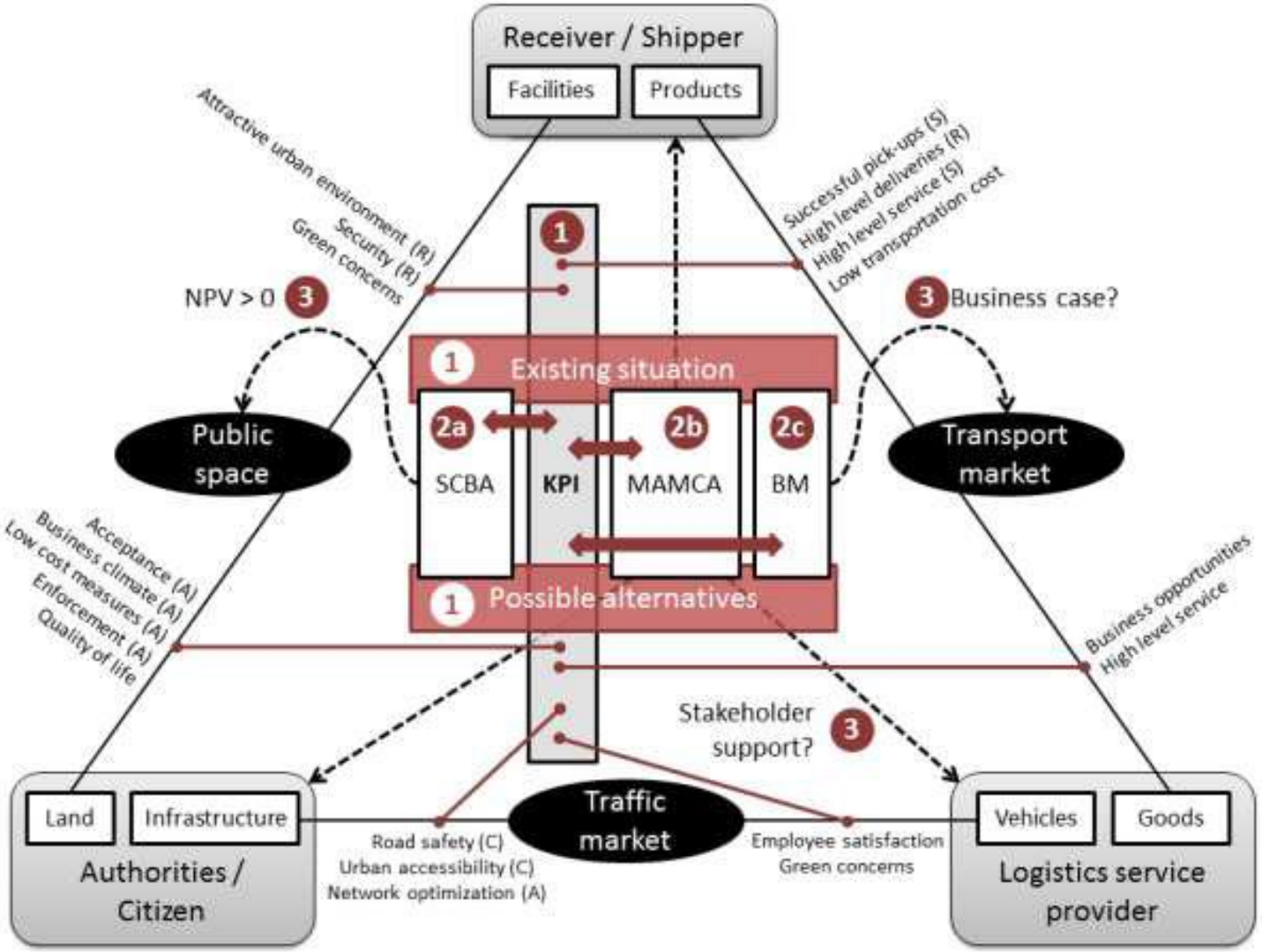
# Motivation for the Mobile Depot

-Decrease congestion


-Cost-efficiënt
-Good customer service

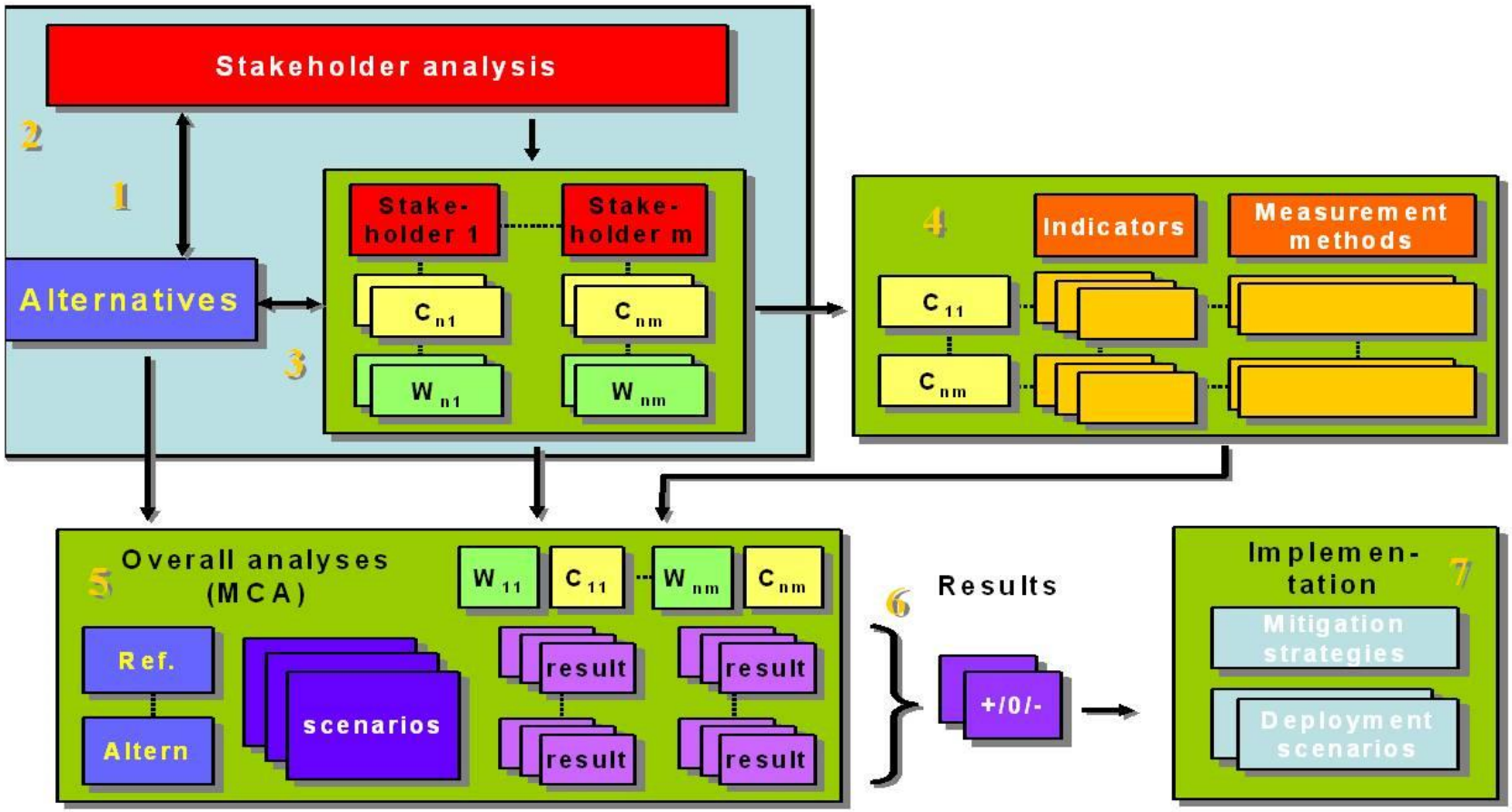
-Decrease CO2 emissions
-Better air quality

# Evaluation framework




Source: STRAIGHSTOL, Deliverable 3.4

# Multi-Actor, Multi-Criteria Analysis (MAMCA)




Source: Macharis (2000, 2005)

# Alternatives

- BAU: Business as usual, deliveries with diesel vans
- Scenario 1 (S1): Demonstration, 3 postal codes, 40% of capacity, only TNT Express
- S2: Scaled, similar to S1 with 90% of capacity, only TNT Express
- S3: Scaled, similar to S2 with low congestion charge
- S4: Scaled, similar to S2 with high congestion charge
- S5: Scaled, S2 but also for other courier services
- S6: Multiple mobile depots with 90% of of capacity throughout the Brussels-Capital-Region, only TNT Express

# Stakeholders, criteria and weights

| Stakeholder group | Criterion | Criterion definition | Weight |
|---|---|---|---|
| **Logistics Service Providers** | Viability of investment | A positive return on investment | 27 |
| | Profitable operations | Making profit by providing logistics services | 25.9 |
| | High level service | Receiver and shipper satisfaction | 22.8 |
| | Green concerns | Positive attitude towards environmental impact | 14.8 |
| | Employee satisfaction | Employees are satisfied with their work and working environment | 9.5 |
| **Shippers** | Cost deliveries | Low out-of-pocket costs for transport | 35.1 |
| | High level service | Receiver satisfaction | 31.5 |
| | Successful pick-ups | Punctual and secure pick-ups with no damage | 22.9 |
| | Green concerns | Positive attitude towards environmental impact | 10.4 |
| **Receivers** | Transportation costs | Low costs to receive goods | 46.7 |
| | Convenient high level deliveries | Deliveries that do not compromise the receiver operations | 29.4 |
| | Attractive urban environment | Nice and liveable surroundings | 14.1 |
| | Green concerns | Positive attitude towards environmental impact | 9.8 |
| **Citizens** | Safety | Positive impact on road safety | 36.7 |
| | Emissions | Reduce emissions of CO2, NOx, PM2.5, PM10 | 31.4 |
| | Urban accessibility | Reduce freight transport, less congestion | 4.6 |
| | Visual nuisance | Less space occupancy by trucks | 7.3 |
| **Local authorities** | Quality of life | Attractive environment for citizens | 61.0 |
| | Network optimization | Optimal use of existing infrastructure | 22.5 |
| | Social political acceptance | Citizens support for measures | 9.8 |
| | Cost measures | Low costs to implement the measures | 6.7 |

# Overall analysis: PROMETHEE

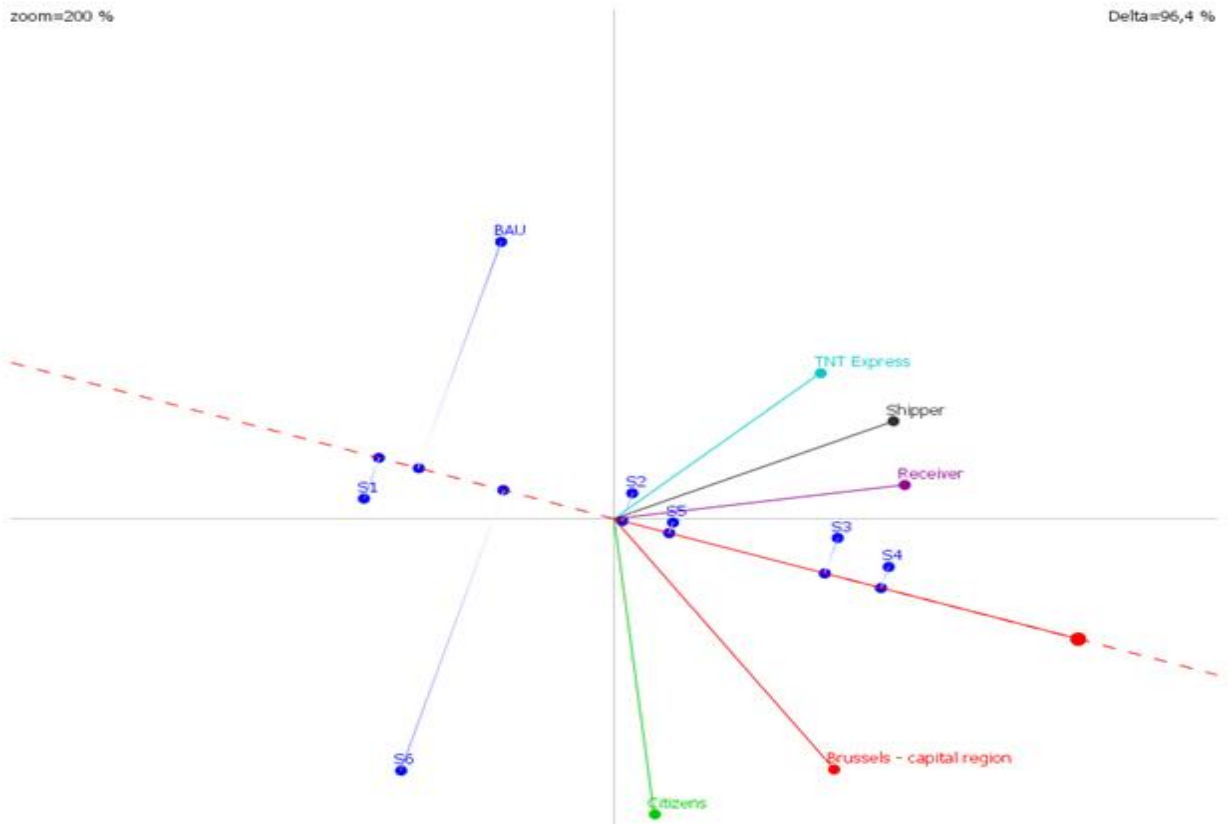
PROMETHEE-Group Decision Support System (GDSS) outranking method

To tackle the ranking problem involving several decision makers (TNT Express, shippers, receivers, citizens and local authorities)

Score and rank each scenario of the decision problem

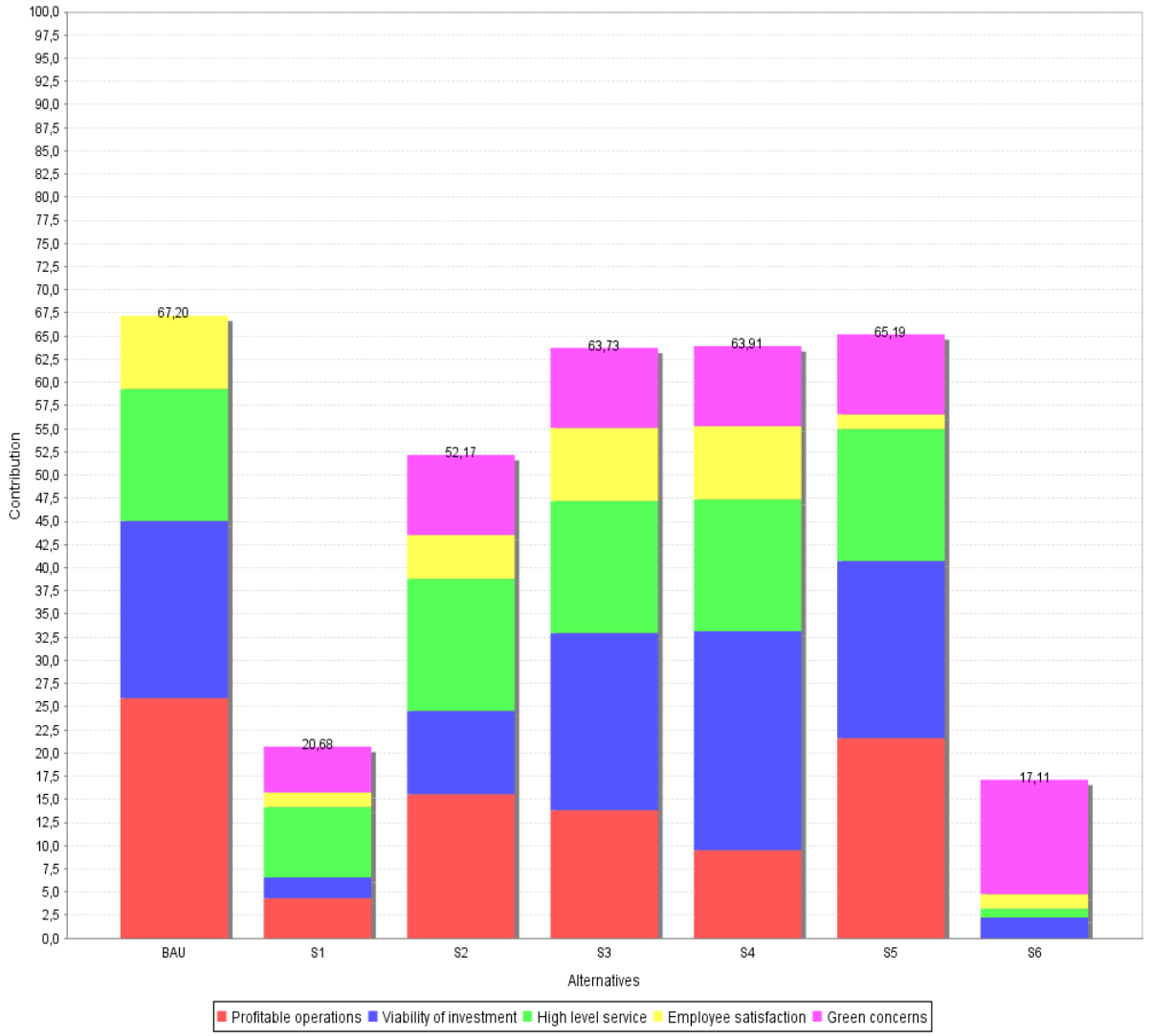
PROMETHEE-GDSS: Aggregating individual rankings into a group ranking

# Results visualization: GAIA

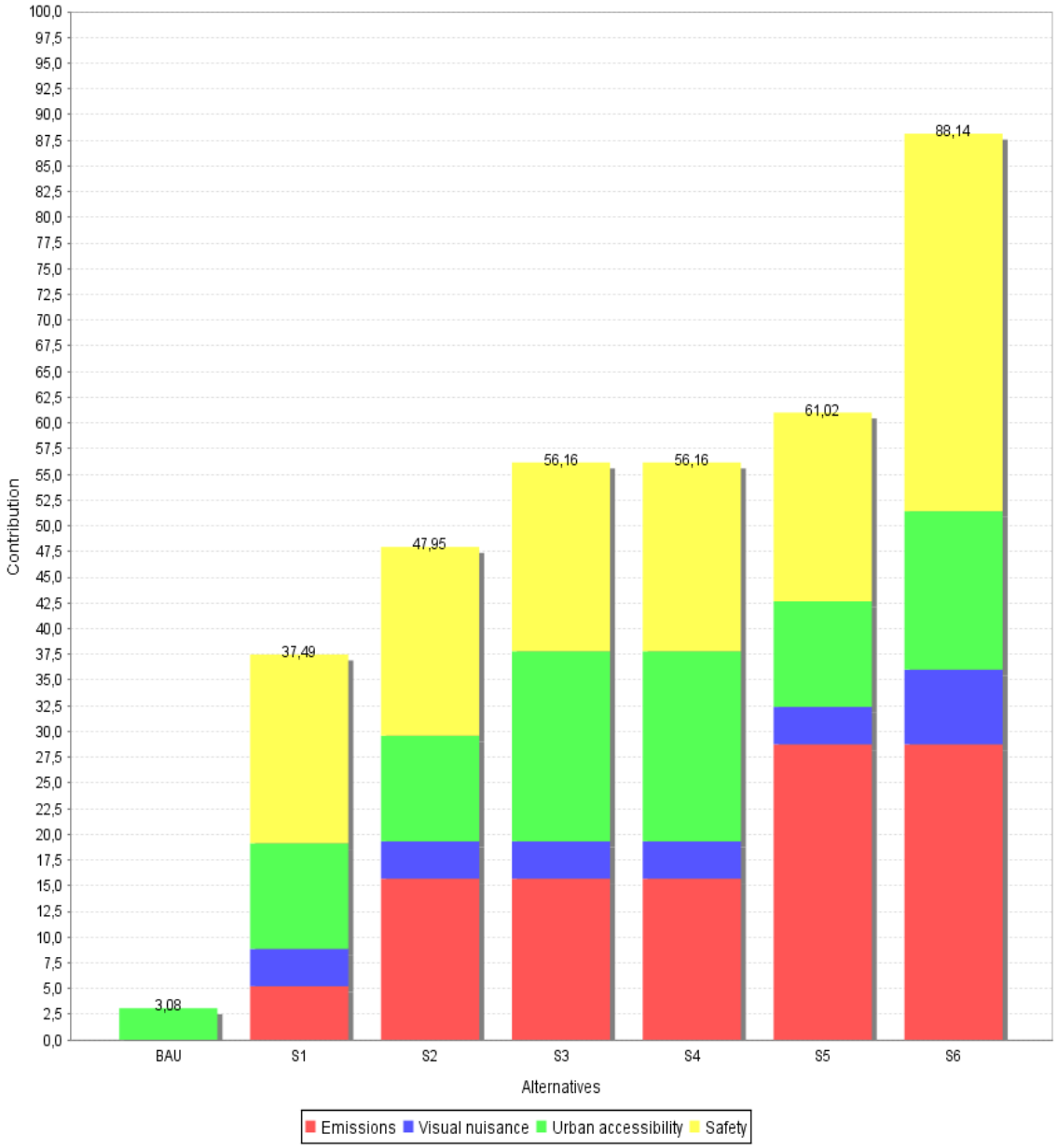



| Legend to the scenarios | |
|---|---|
| BAU | Business As Usual |
| S1 | Mobile Depot |
| S2 | MD full capacity |
| S3 | MD full capacity & congestion charging scheme low toll level |
| S4 | MD full capacity & congestion charging scheme high toll level |
| S5 | MD full capacity & other LSPs |
| S6 | Multiple MD full capacity |

# Criteria contribution chart: TNT Express



# Criteria contribution chart: Citizens



# Conclusions

Overall 3 observations with the aid of GAIA

- Similarity in preferences of stakeholders (detect conflict and identify clusters)
- Alternative that contributes most to criteria of all stakeholders (decision stick)
- Position of stakeholder towards each alternative

Criteria contribution chart gives more insight per stakeholder group

Mobile depot: future implementation?

# Thank you for your attention!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