

# MODI T1.3 Business Models

17<sup>th</sup> October 2025

Institute of Transport Economics (TØI)

# Introduction

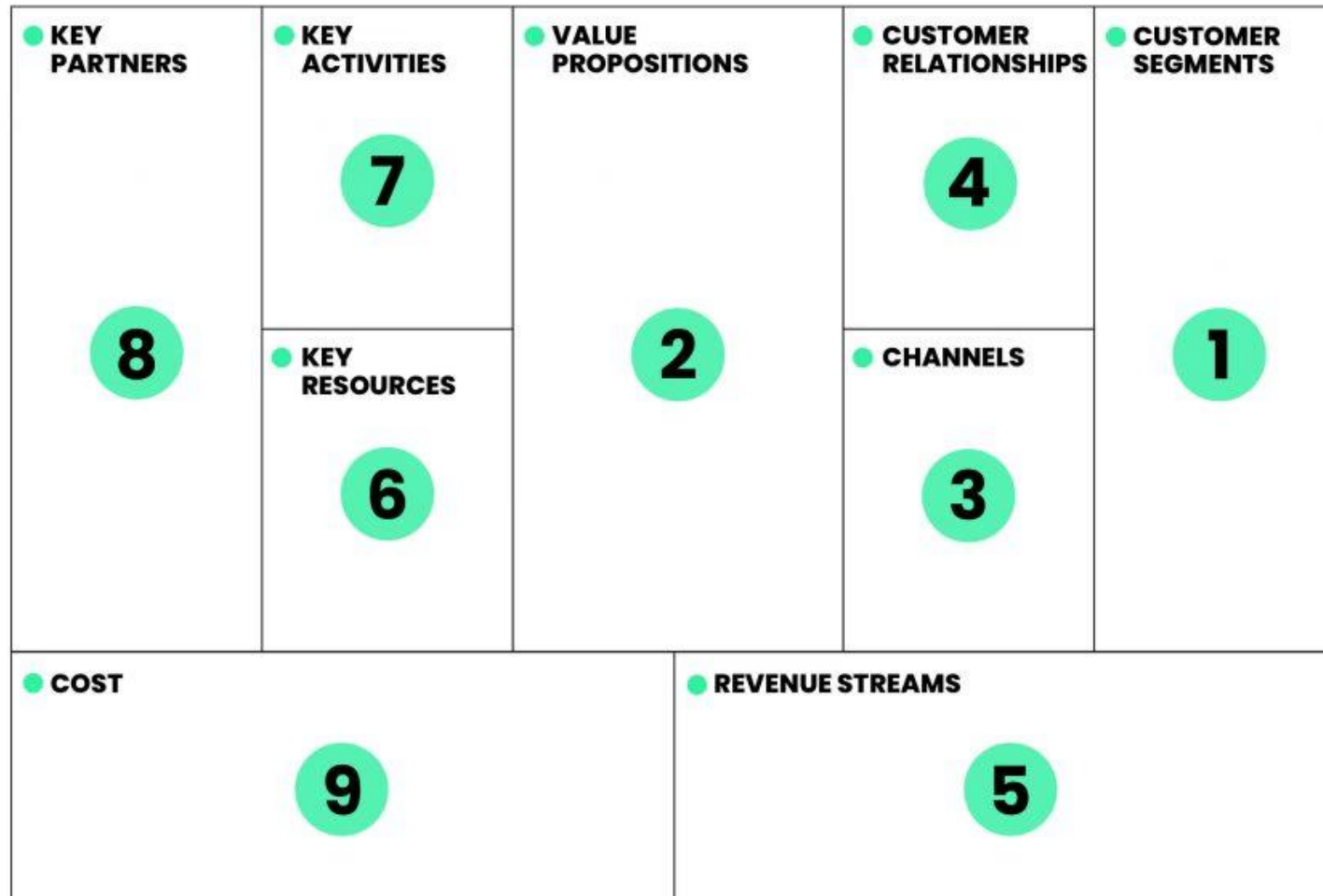
- Freight transport is under pressure to decarbonize, improve efficiency, and deal with driver shortages.
- L4 CCAM freight vehicles may address these challenges and change value creation in logistics ecosystems.
- The network of actors need to co-create new business models that bring value to the network.

# Approach in MODI

- **Business Model Canvas (BMC)** was used.
  - We mapped **different actors in logistics** (e.g., shippers, carriers, OEMs and technology providers, infrastructure operators, representative organizations, public sector).
- Goal: understand how L4 CCAM affects their **needs and value propositions**
- **Can these be aligned in future business models?**  
Starting point for creating value for the network!

# Qualitative data collection and BMC mapping

## | BUSINESS MODEL CANVAS



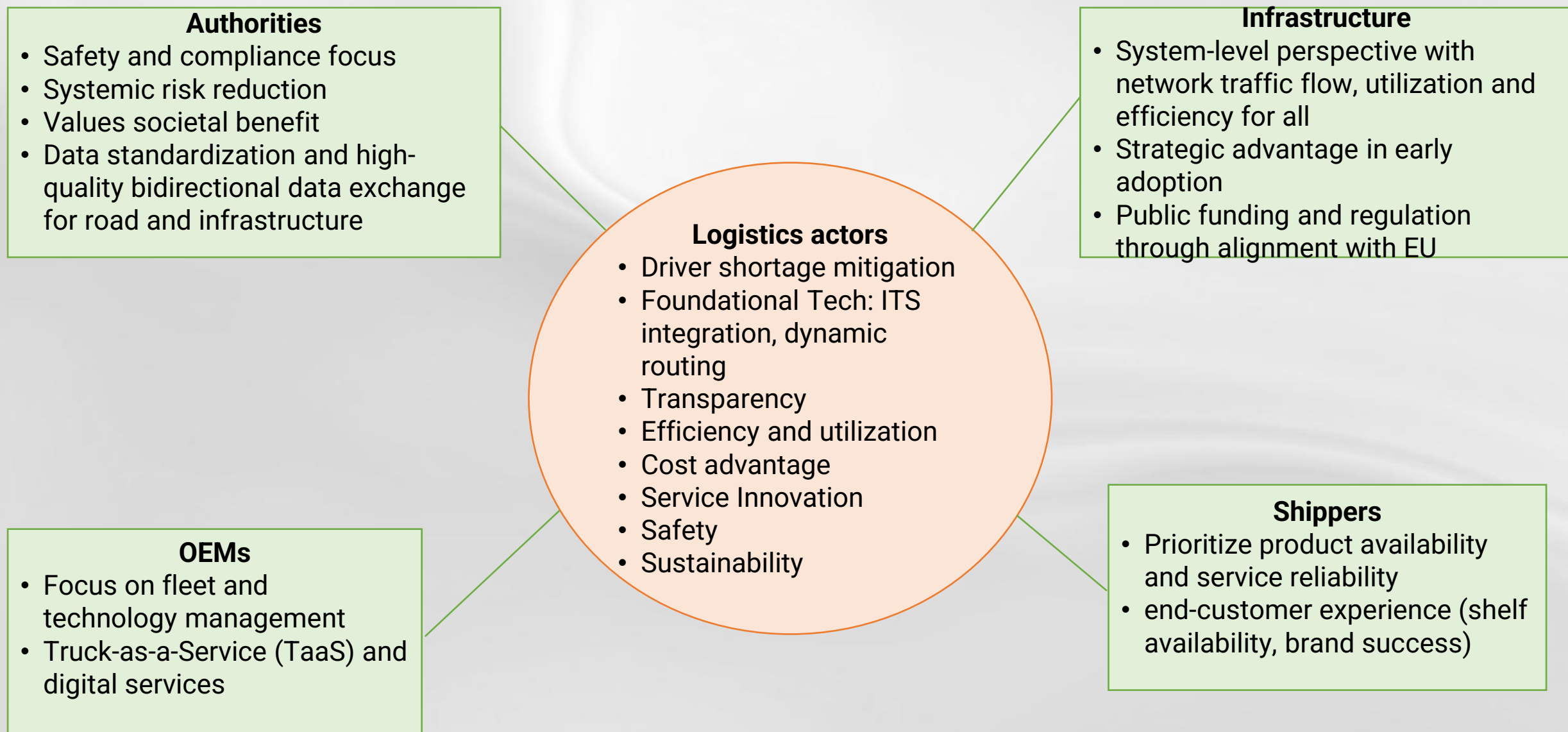
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| <p><b>Key Partners</b></p> <p><b>Present:</b></p> <ul style="list-style-type: none"> <li>• Ports &amp; terminals</li> <li>• LSPs &amp; subcontractors</li> <li>• OEMs</li> <li>• Fuel &amp; energy providers</li> <li>• Rail/ferry modal operators</li> </ul> <p><b>Future:</b></p> <ul style="list-style-type: none"> <li>• Regulators &amp; ITS authorities</li> <li>• Integrated energy alliances</li> <li>• Training partners</li> <li>• Charging &amp; infrastructure collaborations</li> </ul> | <p><b>Key Activities</b></p> <p><b>Present:</b></p> <ul style="list-style-type: none"> <li>• Shipping, trucking, warehousing, customs</li> <li>• Fleet &amp; logistics management</li> </ul> <p><b>Future:</b></p> <ul style="list-style-type: none"> <li>• Smart planning, predictive operations (gating, charging etc)</li> <li>• Automated scheduling &amp; integrated digital communication</li> <li>• Focus on optimization</li> </ul> <p><b>Key Resources</b></p> <p><b>Present:</b></p> <ul style="list-style-type: none"> <li>• Fleets, terminals, (semi-automated) warehouses</li> <li>• Partial digital systems (twins, control towers)</li> <li>• Skilled workforce but not enough drivers</li> </ul> <p><b>Future:</b></p> <ul style="list-style-type: none"> <li>• End-to-end digital integration</li> <li>• High-capacity charging networks</li> <li>• Re-skilled workforce with high digital literacy</li> </ul> | <p><b>Value Proposition</b></p> <ul style="list-style-type: none"> <li>• Driver shortage mitigation</li> </ul> <ul style="list-style-type: none"> <li>• Foundational Tech: Real-time ITS integration, dynamic routing</li> </ul> <ul style="list-style-type: none"> <li>• Transparency: End-to-end visibility, full traceability</li> </ul> <ul style="list-style-type: none"> <li>• Efficiency: Continuous ops, optimized scheduling, asset use</li> </ul> <ul style="list-style-type: none"> <li>• Cost Advantage: Lower OPEX, fewer inefficiencies</li> </ul> <ul style="list-style-type: none"> <li>• Service Innovation: 24/7 delivery, new digital services</li> </ul> <ul style="list-style-type: none"> <li>• Safety: Reduced accidents</li> </ul> <ul style="list-style-type: none"> <li>• Sustainability: Lower emissions, supports net-zero goals</li> </ul> | <p><b>Customer Relationships</b></p> <p><b>Present:</b></p> <ul style="list-style-type: none"> <li>• Dedicated account managers</li> <li>• Self-service + CRM systems</li> <li>• Long-term sustainability partnerships</li> </ul> <p><b>Future:</b></p> <ul style="list-style-type: none"> <li>• Hybrid human-digital model (autonomous booking + human oversight)</li> <li>• Fleet &amp; legal teams manage liability</li> </ul> <p><b>Channels</b></p> <p><b>Present:</b></p> <ul style="list-style-type: none"> <li>• Commercial &amp; sustainability teams</li> <li>• Strategic Customer Council</li> <li>• Manual sustainability reporting</li> </ul> <p><b>Future:</b></p> <ul style="list-style-type: none"> <li>• Digital-first booking &amp; dashboards</li> <li>• Automated, real-time sustainability data</li> </ul> | <p><b>Customer Segments</b></p> <p><b>Present candidates:</b></p> <ul style="list-style-type: none"> <li>• Mature long-haul shippers (500km+), high-value goods</li> <li>• FTL, fixed lanes, low spot activity</li> <li>• Green and innovation-driven customers</li> </ul> <p><b>Future:</b></p> <ul style="list-style-type: none"> <li>• Wider adoption across sectors</li> <li>• Inclusion of perishable/time-sensitive goods</li> </ul> |
| <p><b>Cost Structure</b></p> <p><b>OPEX:</b></p> <ul style="list-style-type: none"> <li>• Reduced driver costs</li> <li>• 24/7 operations</li> <li>• Reduced maintenance &amp; telematics</li> <li>• Uncertain energy/insurance costs</li> </ul> <p><b>CAPEX:</b></p> <ul style="list-style-type: none"> <li>• Higher due to autonomy tech and sensors</li> <li>• ROI improves with ultra-high utilization</li> <li>• leasing can reduce upfront cost</li> </ul>                                     | <p><b>Revenue Streams</b></p> <p><b>Present:</b></p> <ul style="list-style-type: none"> <li>• Transport fees per corridor - km/FEU</li> <li>• 1–3% margins; ROI is about 5 years</li> </ul> <p><b>Future:</b></p> <ul style="list-style-type: none"> <li>• Longer-term contracts (5+ years) and ROI</li> <li>• New services and subscription models</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                            |

# Key insights

- Autonomous Electric Vehicles (AEVs) create a digital, safe, and sustainable logistics network with real-time integration and 24/7 operation.
- Adoption of AEV may shift costs from labour (driver salaries, rest breaks, administrative staff) to capital (trucks themselves, autonomous technology, sensors, charging infrastructure, maintenance of EV systems). New skills will be needed in workforce.
- High utilization and charging infrastructure with high capacity become critical for ROI.
- The future focuses on further digitalization, optimization and automation throughout the logistics process.
- **Collaboration and resource sharing across public and private partners will be key. This requires value alignment!**

# Value proposition by actor group

| Actor Group                                                                                                           | Efficiency & Productivity                                                                                                                                                               | Cost & Revenue                                                                                                                                                                             | Sustainability                                                                                                                                                           | Safety & Reliability                                                                                           | Data & Transparency                                                                                                                                                    | Customer / Societal Value                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Logistics Companies</li> <li>Logistics Representative Organizations</li> </ul> | <ul style="list-style-type: none"> <li>➤ Higher truck utilization, 24/7 ops, fewer empty runs</li> <li>➤ Integrated routing, predictive maintenance, multimodal optimization</li> </ul> | <ul style="list-style-type: none"> <li>➤ Lower cost of labour, maintenance, potentially expanding the margin for revenue</li> <li>➤ Reduced downtime, efficiency-driven savings</li> </ul> | <ul style="list-style-type: none"> <li>➤ Decarbonization via EV/AEV, but depends on subcontractor adoption</li> <li>➤ Reduced fuel/emissions via routing + EV</li> </ul> | <ul style="list-style-type: none"> <li>➤ Predictive maintenance &amp; uptime</li> <li>➤ Reliability</li> </ul> | <ul style="list-style-type: none"> <li>➤ Gaps in full integration, need data sharing and integration</li> <li>➤ Full end-to-end transparency across systems</li> </ul> | <ul style="list-style-type: none"> <li>➤ Improved service reliability and contract flexibility</li> <li>➤ Driver shortage relief, multimodal logistics</li> </ul> |
| <ul style="list-style-type: none"> <li>OEM</li> </ul>                                                                 | <ul style="list-style-type: none"> <li>➤ Automation boosts throughput, night ops, optimized fleets ops</li> </ul>                                                                       | <ul style="list-style-type: none"> <li>➤ Pay-as-you-go models, shift from upfront sales to service revenues</li> </ul>                                                                     | <ul style="list-style-type: none"> <li>➤ AEV supports green branding and CO<sub>2</sub> reporting</li> </ul>                                                             | <ul style="list-style-type: none"> <li>➤ Predictive monitoring lowers risks &amp; downtime</li> </ul>          | <ul style="list-style-type: none"> <li>➤ Digital integration &amp; transparency, after market service</li> </ul>                                                       | <ul style="list-style-type: none"> <li>➤ Transport-as-a-Service, addresses driver shortage</li> </ul>                                                             |
| <ul style="list-style-type: none"> <li>Ports &amp; Terminals</li> </ul>                                               | <ul style="list-style-type: none"> <li>➤ 24/7 ops, fewer delays, peak spreading</li> </ul>                                                                                              | <ul style="list-style-type: none"> <li>➤ Lower staffing needs, higher long-term efficiency</li> </ul>                                                                                      | <ul style="list-style-type: none"> <li>➤ Lower emissions &amp; congestion, noise reduction</li> </ul>                                                                    | <ul style="list-style-type: none"> <li>➤ Reliability through automation and predictable timetables</li> </ul>  | <ul style="list-style-type: none"> <li>➤ Real-time visibility on gating/loading processes</li> </ul>                                                                   | <ul style="list-style-type: none"> <li>➤ Competitive advantage</li> </ul>                                                                                         |
| <ul style="list-style-type: none"> <li>Shippers</li> </ul>                                                            | <ul style="list-style-type: none"> <li>➤ Faster deliveries, optimized distribution, fewer stockouts</li> </ul>                                                                          | <ul style="list-style-type: none"> <li>➤ Lower admin &amp; labor costs, long-term transport savings</li> </ul>                                                                             | <ul style="list-style-type: none"> <li>➤ Reduced emissions with EVs &amp; optimized logistics</li> </ul>                                                                 | <ul style="list-style-type: none"> <li>➤ Safer working conditions, redeployment of drivers</li> </ul>          | <ul style="list-style-type: none"> <li>➤ Better tracking, compliance, and asset use</li> </ul>                                                                         | <ul style="list-style-type: none"> <li>➤ Ensures product availability, improved shelf reliability</li> </ul>                                                      |
| <ul style="list-style-type: none"> <li>Authorities</li> </ul>                                                         | <ul style="list-style-type: none"> <li>➤ Traffic optimization without new infrastructure</li> </ul>                                                                                     | <ul style="list-style-type: none"> <li>➤ Cost efficiency through data-driven road use</li> </ul>                                                                                           | <ul style="list-style-type: none"> <li>➤ AEVs reduce emissions</li> </ul>                                                                                                | <ul style="list-style-type: none"> <li>➤ Safer roads, fewer accidents, lower stress</li> </ul>                 | <ul style="list-style-type: none"> <li>➤ HD maps, bidirectional data sharing, dynamic management.</li> </ul>                                                           | <ul style="list-style-type: none"> <li>➤ Safety, urban livability</li> </ul>                                                                                      |



# The network and the value map

## Shared values

1. Operational Efficiency & Productivity:  
higher throughput, optimized route planning, and 24/7 operations.
2. Sustainability & Decarbonization
3. Safety & Risk Reduction
4. Digitalization & Transparency:  
Real-time tracking, predictive maintenance, and integrated digital platforms

## Actors and collaboration needs

1. Infrastructure & Regulation: Authorities and OEMs need investment and standardization, but operators face slow permitting and high upfront costs.
2. Cost & ROI Timing: LSPs and shippers worry about long payback periods and high CapEx for AEVs.
3. Operational Autonomy vs. Human Roles: Workforce concerns arise (drivers, dispatchers) vs. automation gains.
4. Data Sharing & Trust: AEV benefits rely on open data, but competitive actors resist sharing operational data.

# Next stage

- ALICE and TOI will organize a dedicated workshop in the coming months, focused on Business Models and the TCO Calculator for Autonomous Electric Vehicles (AEVs) in logistics operations.
- Join us in shaping the future business models for AEVs, your insights will be key to the next phase of development.
- Invitation to follow soon!

## SLIDO Session

Now we invite you to join the **SLIDO session to validate our initial findings on Business Models for Road Transport Automation.**