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A Review on Societal Impacts of the Future Connected and Automated Transport Systems

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Hosted and organised by: LVM Ministry of Transport and Communications, Traficom Finnish Transport and Communications Agency, Väylä, Business Finland, VTT
Co-organised by: European Commission
Together with: ACARE, alice, CEDR, ECTP, ERRAC, ERTRAC, ETRA, Waterborne

The LEVITATE project

- **Project partners**
  - LOUGH (UK), AIT (AT), AIMSUN (ES), NTUA (EL), POLIS (BE), SWOV (NL), TOI (NO), TfGM (UK), City of Vienna (AT), QUT (AU), TJU (CN), UMTRI (US)
- **Duration of the project**:
  - 36 months (December 2018 – December 2021)
- **Operational Program**:
  - European Union’s “Horizon 2020” research and innovation program

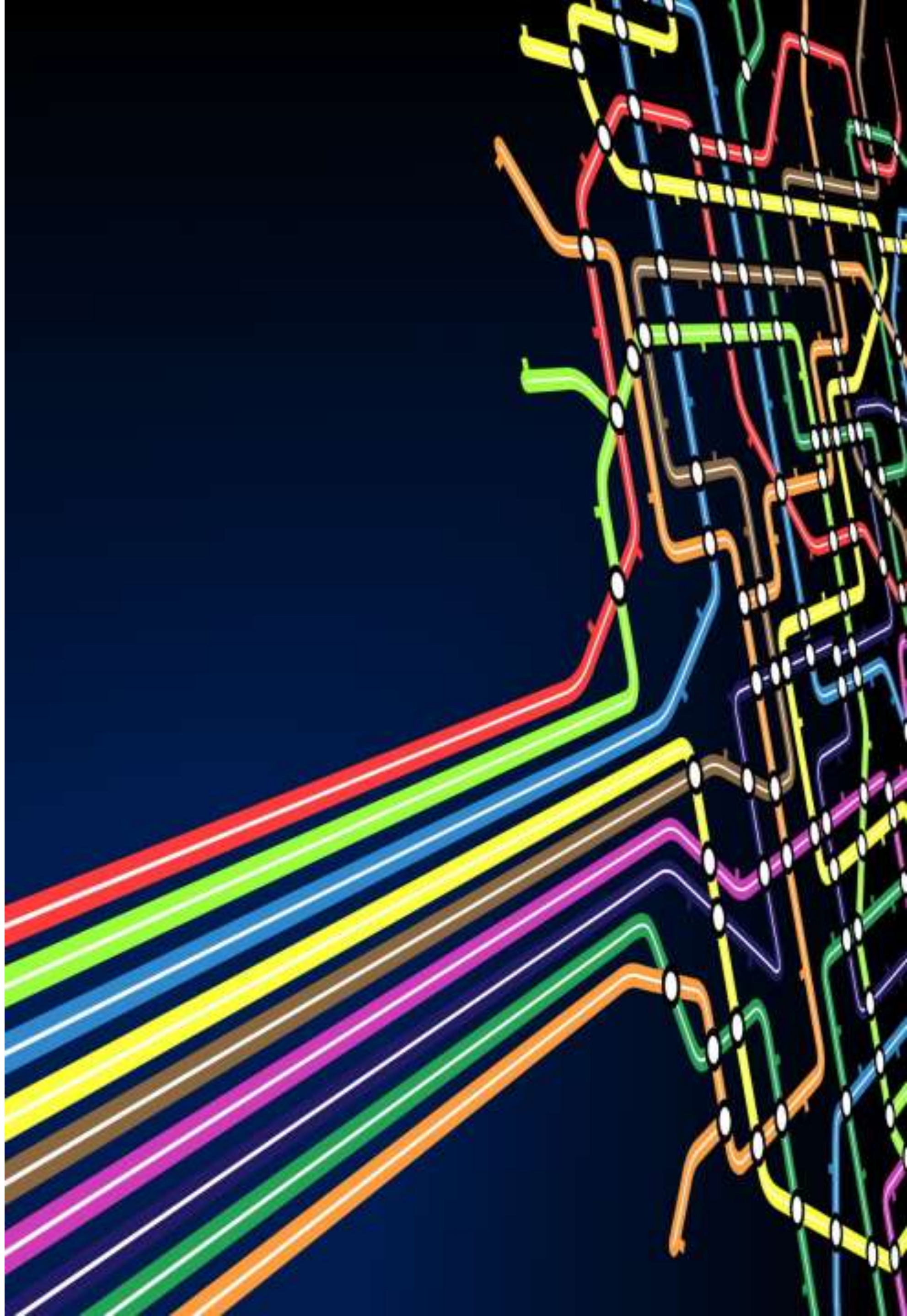
Scope

- LEVITATE focuses on the development of a new impact assessment framework, in order to enable policymakers to manage the introduction of connected and automated transport systems, **maximise the benefits and utilise the technologies to achieve societal objectives**

- Development of an open access web-based **Policy Support Tool** targeting Decision makers at all levels: Municipalities, Regional Authorities and National Governments

Objectives

- New web-based **Policy Support Tool** – Decision Support System
- Range of **forecasting and backcasting** scenarios: automated urban transport, passenger cars, freight services
- Multi-disciplinary methodology to assess short, medium and long term **impacts**
- **Case studies**: mobility, environment, safety, economic and societal indicators



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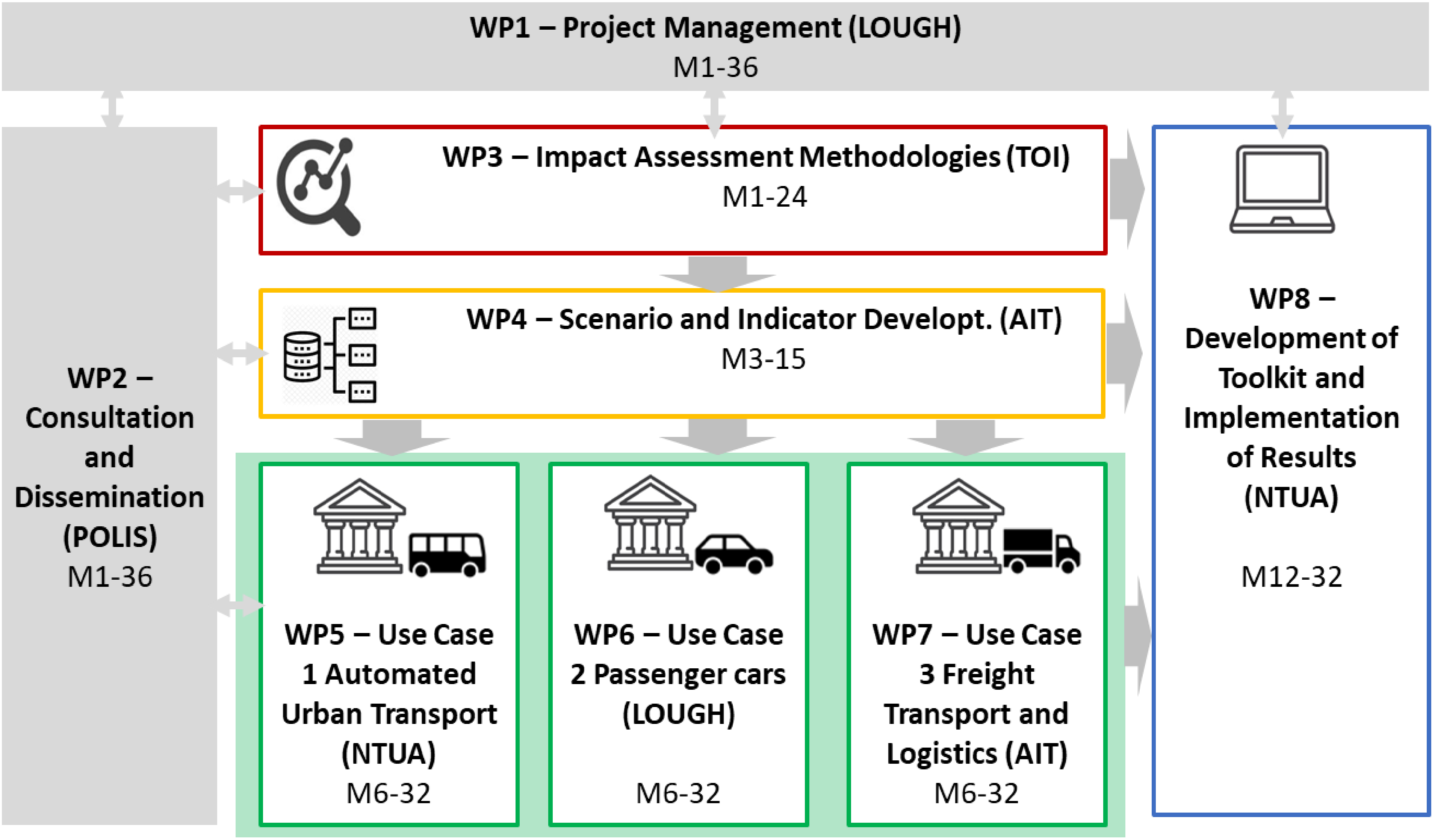
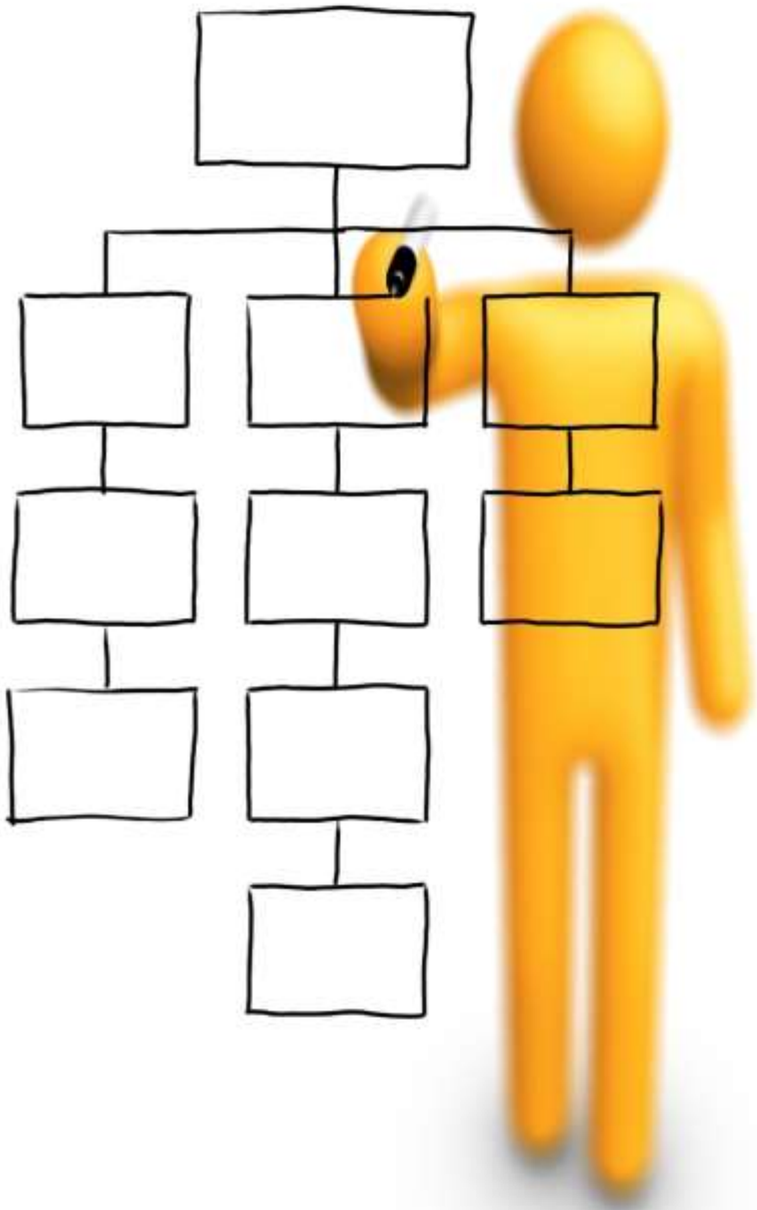
Structure


WP1 – Project Management (LOUGH)
M1-36
WP2 – Consultation and Dissemination (POLIS)
M1-36
WP3 – Impact Assessment Methodologies (TOI)
M1-24
WP4 – Scenario and Indicator Developt. (AIT)
M3-15
WP5 – Use Case 1 Automated Urban Transport (NTUA)
M6-32
WP6 – Use Case 2 Passenger cars (LOUGH)
M6-32
WP7 – Use Case 3 Freight Transport and Logistics (AIT)
M6-32
WP8 – Development of Toolkit and Implementation of Results (NTUA)
M12-32

Impacts Taxonomy

- **Direct impacts:** changes that are noticed by each road user on each trip
  - Travel time, travel comfort, value of travel time, vehicle operating cost, vehicle ownership cost, access to travel
- **Systemic impacts:** system-wide impacts within the transport system
  - Amount of travel, road capacity, congestion, infrastructure wear, modal split of travel, optimization of route choice, vehicle ownership rate, shared mobility, vehicle utilization rate, parking space, traffic data availability
- **Wider impacts:** changes occurring outside the transport system
  - Trust in technology, road safety, propulsion energy, energy efficiency, vehicle emissions, air pollution, noise pollution, public health, employment, geographic accessibility, inequality in transport, commuting distances, land use, public finances



CATS technology within public transport

- **Buses**, other rad vehicles and **rail-bound services**

- **5 Grades of automation** (UITP, 2012)
  - Grade 0 - conventional train operation in ordinary roadways
  - Grade 1 - train control and manual operation
  - Grade 2 - the trip is in a semi-automatic train operation (STO)
  - Grade 3 - driverless train operation (DTO)
  - Grade 4 - unattended train operation (UTO)

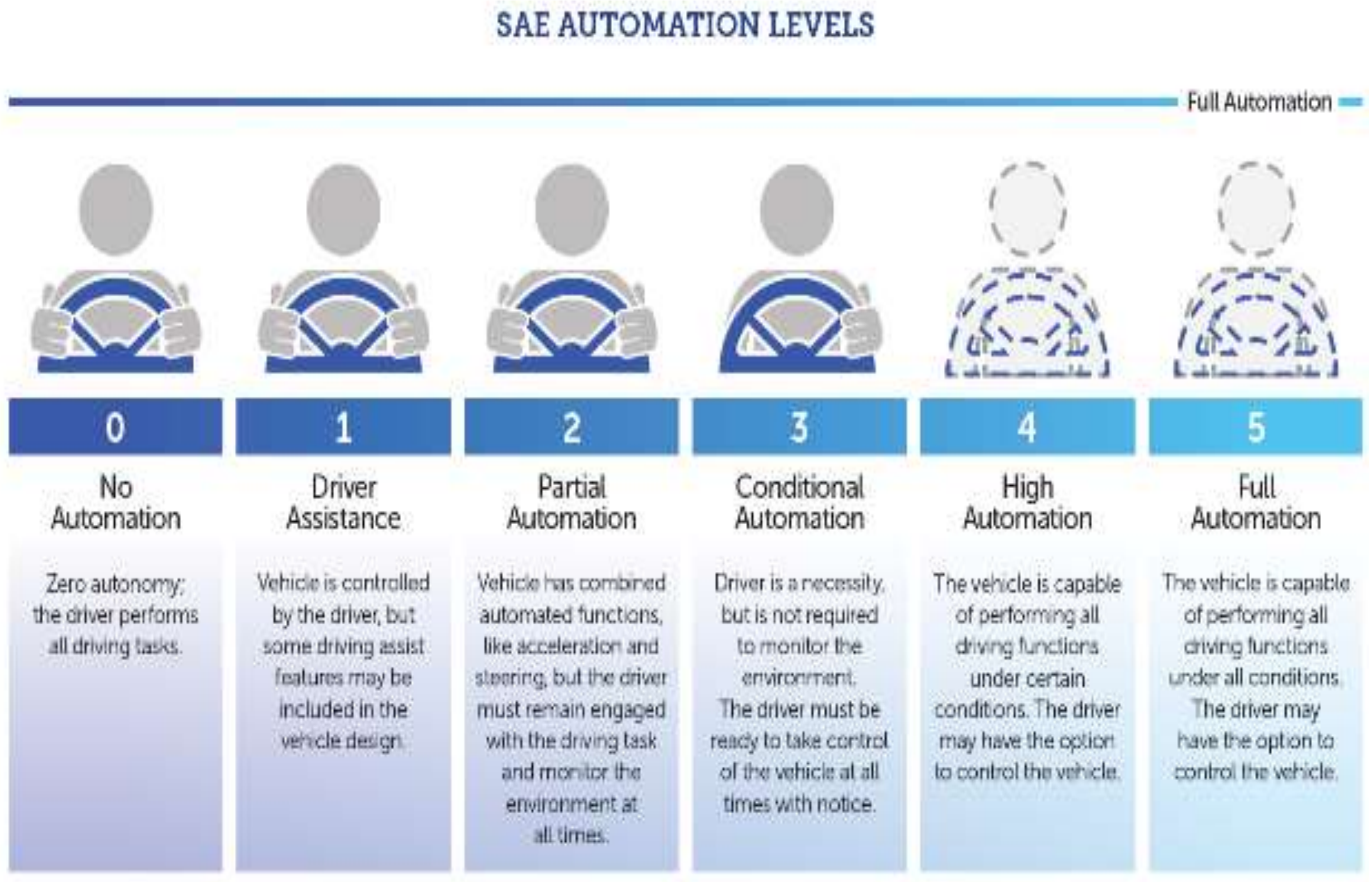
- **Pessimistic** scenario: public transport will suffer due to the **focus on autonomous private cars**
- **Optimistic** scenario: shared autonomous cars will provide **great coverage** for all regions of the city

Automated public transport impacts

- **Reduced crash rate**
- Increased **punctuality**
- **Shorter headways**
- Greater **availability**
- Boost the use of **other transport systems** by providing first and last mile services
- Congestion unless **changes in road network** also take place
- Increase **travel comfort** by reducing crowdedness and enhancing privacy
- Facilitate a **transition to Mobility as a Service** (MaaS)

AVs technology evolution

- **5 Levels of automation** (additional to baseline) have been introduced (SAE, 2016)
- As Levels increase, vehicles become **more independent but require more sophisticated equipment** to operate.



Source: NHTSA, 2017

AVs expected impacts (1/2)

- Contribution at a **reduction in fatalities**
- Improvement in **fuel economy**
- Increase in the capacity of **travel lanes**
- Reduction in **congestion fuel consumption due to** the wide adoption of CATS
- **Expansion of accessibility** and road user categories; children/elderly/disabled individuals will gain access to independent car transport

AVs expected impacts (2/2)

- Reduced parking spaces that can be repurposed and wide-scale **land-use changes**
- Potential **congestion** in major cities in the **short term**
- In the **short- and medium-term** future the high cost of owning a private automated vehicle could lead to **social inequality**
- other modes of transport, such as walking and cycling, could be abandoned leading to a **decrease of public health due to a sedentary way of life** as AVs offer the possibility of comfortable door-to-door travel

CATS technology within freight transport

- **Level 1 and 2**: small shifts from driver-controlled variables to automated ones, which mainly contribute to **safety benefits**
- **Level 3**: significant changes since most of the miles can be driven autonomously **on the highway**
- **Level 4**:
  - will take on hub-to-hub transports and operate in designated corridors. These can either be **highly automated trucks** with driver cabin or potentially also unmanned vehicles with remote support / supervision
  - perform automated operations on **open roads** in urban environment and **handle mixed traffic** in all typical scenarios without driver intervention

Automated freight transport impacts

- **Revolutionize** the **trucking industry** and the way fleets operate
- Improve fleet **efficiency**, **flexibility**, and the total cost of ownership
- **Operating cost reductions** significantly higher in long-distance freight
- Platooning can **reduce** the **fuel consumption**
- Indirect **reduction** of **CO2 emissions**
- **Loss of truck-driving jobs** is still a controversial topic
- Changes for end-consumers are **less significant**

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Future Challenges

- Impacts **quantification**
- Identification of **multi-modal impact**
- Measure **combined effect** of automation impacts
- Simulation of different **automation levels**
- Definition of **relationships** between policy interventions, parameters and impacts

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