Societal Level Impacts of Connected and Automated Vehicles

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Together with:
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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)

- **Framework Program:**
  - Horizon 2020 - The EU Union Framework Programme for Research and Innovation – Mobility for Growth
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
Structure

WP1 – Project Management (LOUGH)
M1-36

WP3 – Impact Assessment Methodologies (TOI)
M1-24

WP4 – Scenario and Indicator Develop. (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 and Scenarios

- Identification of potential impact areas:
  - Safety, Environment, Society, Economy
- Measuring and predicting impacts
- Data collection and backcasting
- Converting impacts to monetary terms
- Quantitative and qualitative indicators
- Scenario specification
- Specification of potential policy objectives
- Simulation modelling and classical statistical models
- Produce guidelines and recommendations
Use Cases

- e-hailing
- Automated ride sharing
- Anywhere to anywhere shuttle
- Multi-modal integrated payments
- Point to point shuttle
- Last-mile shuttle (from/to major transit stations)
- Freight transport
- MaaS / Public transport
- Depot to depot automated transfer
- Automated intermodal transport
- Automated urban delivery
- Local freight consolidation
- Green light optimized speed advisory
- Day 1 Services:
  - Safety V2V
  - Motorway V2I
  - Urban V2I
- Day 1.5 Services:
  - Parking V2I
  - Collision V2V
  - Routing V2I
- Geo-fencing based powertrain use
- Interventions
- Highway / truck platooning
- Urban platooning
- Highway / road usage
- Street design implications
- Segregated pathway operations
- Road use pricing
- Centralized traffic management
- Intelligent access control for infrastructure/bridge

SAE L3/4/5 - Autopilots

SAE L1/2 – CATS components

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Policy Support Tool

Knowledge Module

- Bibliography
- Levitate results
- Tools Documentation
- Guidelines

Estimator Module

Forecasting sub-system

- Policy Interventions
  - introduction of a city toll for non-automated vehicles
  - economic incentives for AV purchase
  - provision of dedicated lanes for AVs
  - introduction of tax on vehicle ownership, traffic restrictions for non-automated vehicles
  - .... etc.

- Factors
  - Vehicle type
  - Area type
  - GDP
  - AV penetration rate (per SAE Level)
  - Automation type
  - Level of shared mobility
  - Vehicle ownership rate
  - Share of electric vehicles
  - Share of pedestrians
  - Share of cyclists
  - Share of PTWs
  - .... etc.

- Impacts
  - Crashes
  - Fatalities
  - Air Pollution
  - Noise Pollution
  - Energy efficiency
  - Vehicle purchase cost
  - Vehicle operating cost
  - Vehicle maintenance cost
  - Vehicle insurance cost
  - Direct cost of travel
  - Change in travel time
  - Travel comfort
  - Valuation of travel time
  - Congestion
  - Pavement wear
  - .... etc.

Backcasting sub-system

Utilization of forecasting in an iterative process ("goal seek"), testing alternative policy interventions until the desired impact(s) is obtained.
Project Impact

- Flexible tool for diverse decision makers needs
- Backcasting system providing insight on measures to reach cities objectives
- Provide a multidisciplinary impact assessment methodology
- Identify significant impacts of CATS on safety, environment, mobility and society.
- Bridge the gap between technology and policy objectives
- Support cities with CATS implementation without the unwanted and unforeseen consequences and rebound effects
Future Challenges

- Accurate quantification of impacts
- Identification of multi-modal impact
- Measure combined effect of automation impacts
- Simulation of different automation levels
- Definition of links and interrelations between policy interventions, factors and impacts
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