



TRACE

inTegration & haRmonizAtion of logistiCs opErations

TRACE: Integration and Harmonization of Logistics Operations

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TRACE Project Overview

TRACE addresses the transformation of Logistics into a sustainable, resource efficient vertical industry through the incorporation of Transport engineering and intelligent transport systems, towards enabling continuously-informed, autonomous, high-performant logistics services across areas.

Call/ Topic	HORIZON-CL5-2022-D6-02-01, Safe, Resilient Transport and Smart Mobility services for passengers and goods
Start	1st of June 2023
Duration	36 months
Partners	28 Partners from 15 countries 10 research institutes & 18 companies
Project Coordinator	National Kapodistrian University of Athens
Technical Coordinator	University of Thessaly



Logistics Services Transformation - Vision

One of the most energy consuming industries



Sustainable industry achieving significant reduction of carbon footprint

Multiple systems', Multiple vendors', Multiple operators' environment



Unified Synchronodal Deliveries over a single potentially Multi-System, Multi-Vendor, Multi-Operator platform

Heavily involving Manual Operations



Automated Operations for Goods and Services; Automated Deliveries

Transformation is also a focus of the ICT domain (e.g. 3GPP Standardisation explicitly addresses the Transportation and Logistics services as a separate vertical sector).

ICT Enablers for Advanced Logistics Services

› **IT Domain**

- › AI/ML Techniques for several applications
- › Micro-Services Architecture & Service Orchestration
- › Blockchain Technology
- › Advanced Robotics

› **Network Domain**

- › Data plane Distribution – in 5G Networks
- › Slicing for IoT services
- › Extended Network Coverage
- › Heterogeneous Networks Interoperability
- › ITS/V2X Network services

ITS, V2X & Logistics from Network Perspective

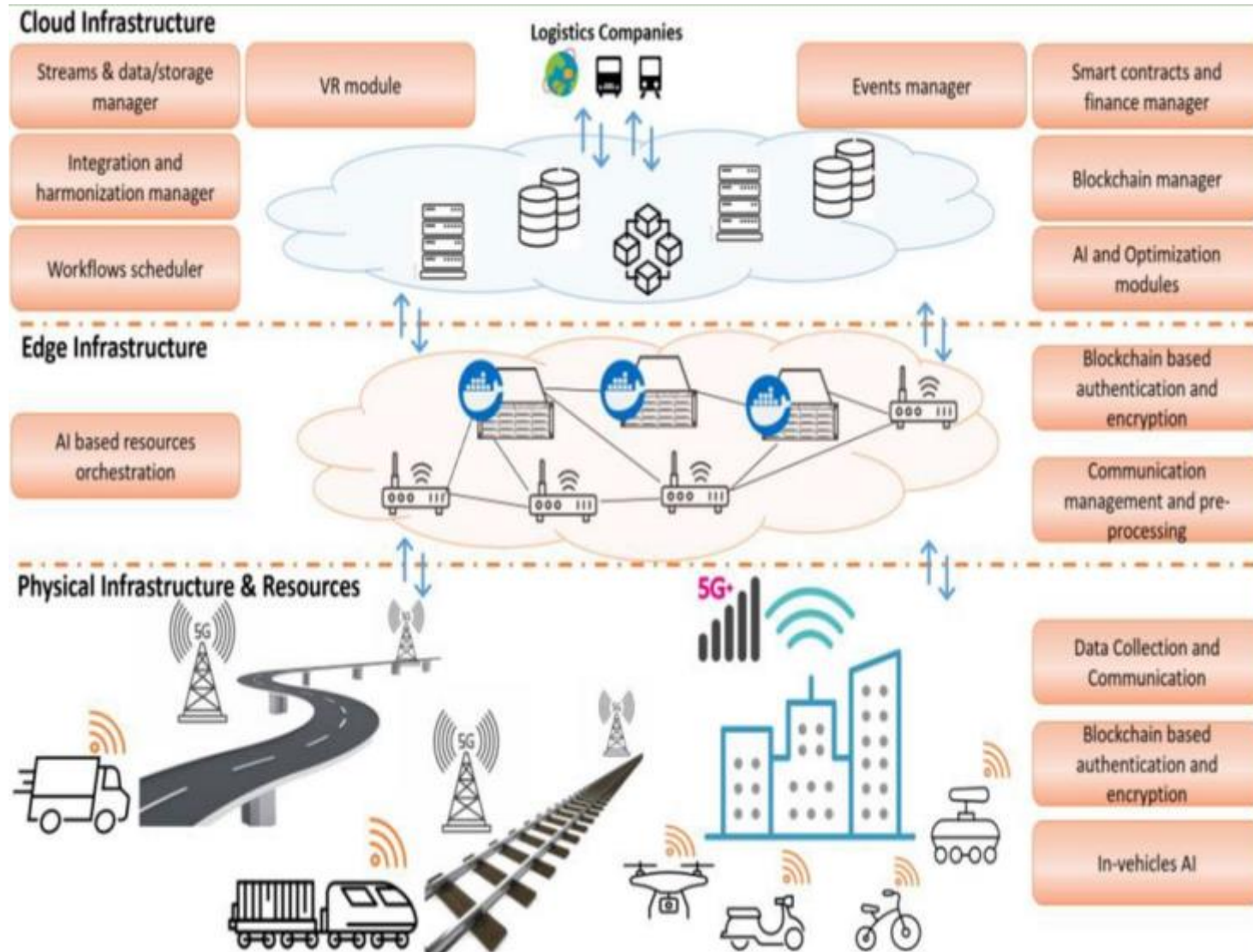
- › KPIs defined by SDOs & Industry Initiatives for V2X/ CAM/ logistics use cases.
- › 3GPP Standardisation explicitly addresses the Transportation and Logistics services as a separate vertical sector.
- › 3GPP defines V2X KPIs in TS22.185 & V2X Services in TR 22.885. V2X application categories:
 - › Vehicles Platooning,
 - › Advanced Driving (semi-automated or fully automated driving),
 - › Extended Sensors enabling vehicles obtain awareness of local situation,
 - › Remote Driving, and
 - › Vehicle Quality of Service Support (adaptability of service depending on network conditions).
- › 5GAA also analyses an all-encompassing set of V2X UCs, considering 5G not only for V2N but also for V2V and V2I reliable message exchanging.
- › Correspondence between 5GAA & 3GPP categories.

UC group	Max end-to-end latency (ms)	Reliability (%)	Data rate (Mbps)
Vehicles Platooning	10-25	90-99.99	≤65
Advanced Driving	10-100	90-99.99	10-50 UL: 0.25-10 DL: 50 (considers max 200 UEs)
Extended Sensors	3-100	90-99.99	10-1000
Remote Driving	5	99.99	UL: 25 DL: 1

TRACE for Advanced Logistics

- **Goal:** Reduction of current transfers in order to reduce the carbon footprint while securing the uninterrupted deliveries and the resilience to any disruptive event.
- **Objectives:** Optimise synchromodal operations and the integration of heterogeneous logistics services.
- **Solution-Proposition:** A universal platform with functionalities related to planning, scheduling, optimization and events management as well as technologies to facilitate the real time conclusion of smart contracts and financial operations, thus, becoming one of the first attempts to provide an ‘intelligent cover’ upon the current logistics frameworks.
- **Focus Cases:** From transportations with the use of shared resources, the disruptive events detection and re-scheduling of transfers , and further to the use of unmanned vehicles to automate the last mile deliveries.

TRACE Technical Concepts



TRACE Demonstrators



Greek Demonstrator

Locations: Thessaloniki to Athens corridors, NKUA campus Athens



Italian Demonstrator

Locations: Bologna, Modena,



Slovenian Demonstrator

Location: Ljubljana

› **Greek Demo Focus:**

- › A: Synchronodal and Intermodal logistics operations – Athens-Thessaloniki corridors
- › B: Resilience in disruptive events
- › C: Define city corridors and safe exchange areas for deliveries performed by autonomous vehicles

› **Italian Demo Focus:**

- › A: Connection of micro-hubs to support goods delivery
- › B: Last mile delivery in the city of Modena

› **Slovenian Demo Focus:**

- › A: First and Last Mile delivery in Ljubljana shopping, business and leisure center area (BTC City)

TRACE Greek Demonstrator

› Greek Demonstrator Parts:

› **A: Sychromodal and Intermodal logistics operations - Athens-Thessaloniki corridors**

- › AI based optimization of synergy operations between logistics stakeholders (Hellenic Train & ACS courier) in synchro-modal logistics operations.
- › Goal: Maximization of use of environmentally friendly transportation means.

› **B: Resilience in disruptive events**

- › Informed automatic rescheduling of routes using different means of transportation in case of disruptive event
- › Goal: Minimisation of delivery delays enabled by cross-stakeholder operations/functionalities

› **C: Define city corridors & safe exchange areas for deliveries performed by autonomous vehicles**

- › Adoption of unmanned vehicles (ground and aerial) for performing last mile deliveries.
- › Goal: Faster last mile logistics. Platform will assist in definition of transport corridors for feeder vehicles that transfer parcels from a hub towards a safe area.

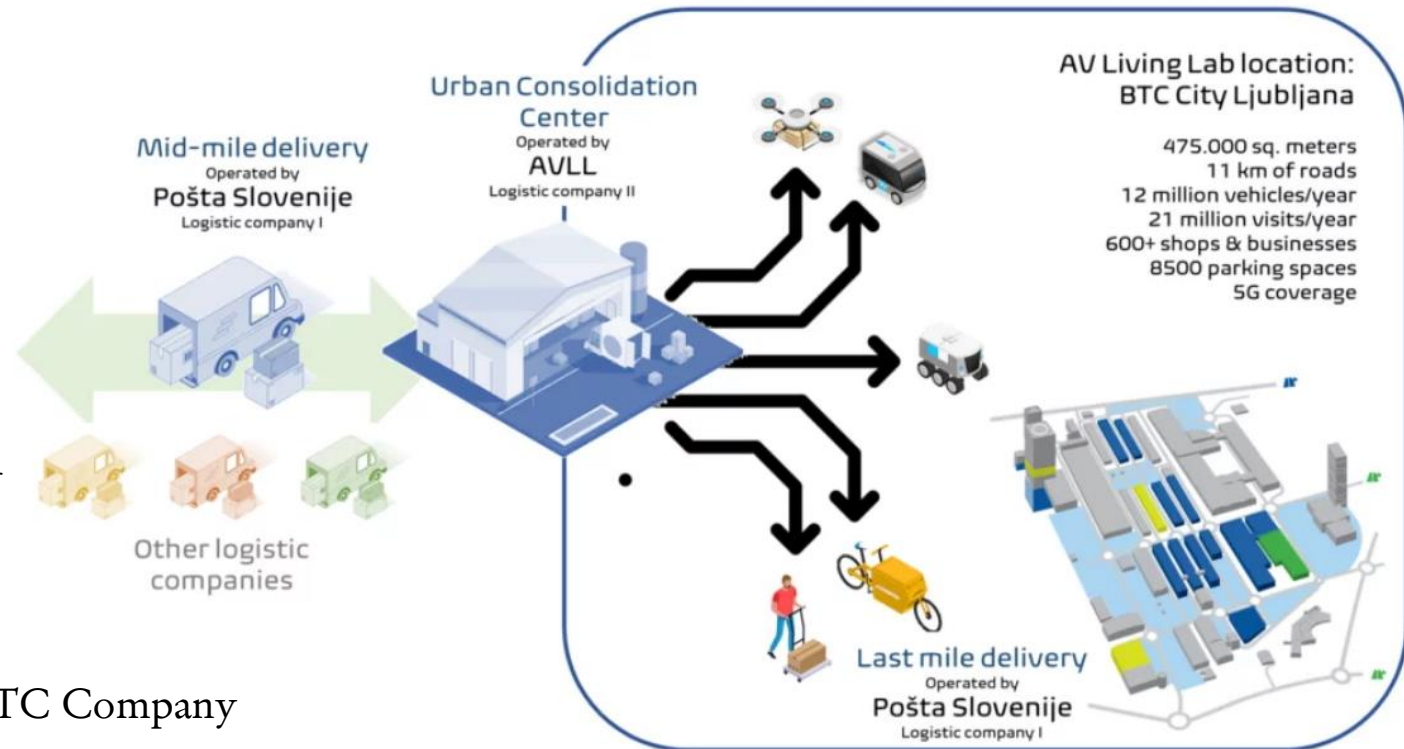
› Key Partners: National Kapodistrian Univ. of Athens, Univ. of Thessaly, Hellenic Train, ACS, COSMOTE, CERTH, Technical Univ. of Crete

TRACE Italian Demonstrator

- › **Italian Demonstrator** focuses on smart and connected vehicles to optimize last-mile deliveries.
- › **Location:** In Modena Automotive Smart Area (MASA) and in the Green Diagonal (a cycling path connecting the city center with an external logistics hub).
- › **Goal:** Autonomous cargo bikes relying on the local IT systems will be employed in two experimental modes:
 - › platooning, where one or more pilotless cargo bikes will follow a lead cargo bike driven by a human operator; and
 - › follow me, where one cargo bike will follow a walking operator along the final delivery route.
- › **Key Partners:** Modena Municipality, Università di Modena e Reggio Emilia, a cargo bike logistic company (URBICO), a cargo bike manufacturer (One Less Van), Centre Suisse d'Electronique et de Microtechnique, Istituto Trasporti e Logistica and a drone service company (DiFly)

TRACE Slovenian Demonstrator

- › **Slovenian Demonstrator** focuses on establishing an Urban Consolidation Center (UCC), enabling parcel consolidation, shared resources optimization and reduction of traffic within a commercial center.
- › **Location:** AV Living Lab, SL, an ecosystem resembling city centers.
- › **Goal:** To merge existing processes of business entities with services of two logistics companies (last mile delivery & micro consolidation centre); Testing logistics collaboration & and developing business models for resource and revenue sharing based on blockchain technology.



- › **Key Partners:** Slovenian Post, University of Maribor, BTC Company

Thanks for Your Attention!



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