

## Destination 6

Safe, Resilient Transport and Smart Mobility services for passengers and goods





## Thematic area

# Cooperative, Connected and Automated Mobility (CCAM)

**Suzanna KRAAK – Andrea DE CANDIDO**

*DG RTD*

**Anna-Marya MARTYSHCHUK**

*DG MOVE*



# HORIZON-CL5-2024-D6-01-01

## Centralised, reliable, cyber-secure & upgradable in vehicle electronic control architectures for CCAM connected to the cloud-edge continuum (CCAM Partnership)



### SCOPE 1/2

- A complete **redesign** of the in-vehicle control architecture, combining innovations at **hardware, software** and **data** levels in the vehicle, as well as **sensors** and **sensor** data fusion for environment perception with AI “at the edge”, using on-board **high - performance computers** and generic hard- and software including **cyber secure** components.
- Build upon a **centralised** e.g., zonal or domain-based layout using distributed high-performance computing for connecting sensing and actuation systems with software updates over the air, big data flows and AI at the edge, resulting in a **novel** and **upgradable** electronic in-vehicle control scheme for safe and efficient automated driving functions and tele-operations.

# HORIZON-CL5-2024-D6-01-01

## Centralised, reliable, cyber-secure & upgradable in vehicle electronic control architectures for CCAM connected to the cloud-edge continuum (CCAM Partnership)



### SCOPE 2/2

- New control architectures should enable:
  - **reliable, low-latency** and **high-bandwidth data communication** for automated driving systems control to safeguard against cyber-attacks, malfunctions and malicious interactions.
  - **systemic functionality gains** in upgradability, efficiency, modularity, compatibility, scalability, fail-operation, reliability and redundancy.
  - definition of **safety** and **security targets**, open-source standard layouts and harmonised validation methods.

# HORIZON-CL5-2024-D6-01-01

## Centralised, reliable, cyber-secure & upgradable in vehicle electronic control architectures for CCAM connected to the cloud-edge continuum (CCAM Partnership)



### EXPECTED OUTCOMES

- New, centralised, reliable, cyber-secure and upgradable **in-vehicle electronic control architectures** for CCAM based on the application of **co-designed hardware, software** and **big or smart data flows** in combination with **over-the-air updates**.
- **Widespread deployment of level 4 automation** in road vehicles by **expanding the ODDs** of the control system towards higher complexity (city traffic, adverse weather conditions etc.) or greater scale.
- **Safe operation of Connected and Automated Driving functions** e.g., regarding Vulnerable Road Users (VRUs) and ODD transitions through system agility, experience-based decision making and access to cloud intelligence.
- Paradigm **shift from human-based and component-supported vehicle control** to a more **integrated, resource efficient and reliable system** for the control of CCAM systems.
- **Strengthened cooperation of European OEMs and suppliers** to co-design a standard cyber secure electronic architecture layout with harmonised interfaces.

# HORIZON-CL5-2024-D6-01-01

Centralised, reliable, cyber-secure & upgradable in vehicle electronic control architectures for CCAM connected to the cloud-edge continuum (CCAM Partnership)



## TYPE OF ACTION

- **RIA** –Research & Innovation Action
- Expected **TRL 5** by the end of the project



## EU CONTRIBUTION

- Per project: **6 M€**
- Total: **12 M€**



## TIMING

- Call opening: **7 May 2024**
- Call closing: **5 September 2024**

- *If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).*
- *Projects will be expected to report on results to the EU CCAM Partnership in support of the monitoring of its KPIs.*
- *International cooperation with the USA and Japan is encouraged.*

# HORIZON-CL5-2024-D6-01-02

## Scenario-based safety assurance of CCAM and related HMI in a dynamically evolving transport system (CCAM Partnership)



### SCOPE 1/2

- Developing a **validation methodology** for **scenario-based** safety assurance of **AI-based CCAM functions** to enhance trustworthiness and robustness of the ODDs.
- Developing **validation procedures** for CCAM systems that rely on **V2X** for safety-critical functions, ensuring reliability, trustworthiness, and cyber-security, and keeping V2X connectivity technology neutral.
- Developing a **continuous safety validation methodology approach**, to monitor the safety state of deployed CCAM systems in real traffic during its service life, following type approval. **Performance metrics** for the reliability of the monitored data, including cyber-security aspects, and indicators for the safety state should be proposed.
- Developing **requirements** for the **monitoring system** for use in **future standardisation**, regarding the exchange of data and safety performance indicators with service organisations and authorities.

# HORIZON-CL5-2024-D6-01-02

## Scenario-based safety assurance of CCAM and related HMI in a dynamically evolving transport system (CCAM Partnership)



### SCOPE 2/2

- Developing **tools** that provide a **high** degree of **detail** and **representation** of other **road users' behaviour** (incl. VRUs, pedestrians, bicyclists) in **virtual scenario-based testing**, incl. methods that deal with perception, localisation, and world modelling errors in the validation procedures.
- Developing a **safety assurance methodology** that incorporates the assessment of **Human Machine Interaction (HMI)** (both driver-vehicle and vehicle-road user) concepts for higher levels of automation (conformity checks as well as test set-ups with suitable metrics) ensuring **safe communication** between driver and vehicle and between vehicle and other road users, making HMI **inclusive** (i.e. in terms of age, mental and physical ability, cultural aspects, etc.).



# HORIZON-CL5-2024-D6-01-02

## Scenario-based safety assurance of CCAM and related HMI in a dynamically evolving transport system (CCAM Partnership)



### EXPECTED OUTCOME

- **Safe scaling-up** of the **deployment of CCAM systems** for **all levels of automation**, including systems that rely on human-machine interaction for parts of the driving phases.
- **Assurance of vehicle safety** despite system changes, e.g., due to software updates and data exchanges between vehicles and the infrastructure.
- **Facilitating** the introduction of **fast developing technological innovations** in the CCAM system's functionality, such as AI.

# HORIZON-CL5-2024-D6-01-02

## Scenario-based safety assurance of CCAM and related HMI in a dynamically evolving transport system (CCAM Partnership)



### TYPE OF ACTION

- RIA –Research and Innovation Action
- Expected **TRL 5** by the end of the project



### EU CONTRIBUTION

- Per project: **14 M€**
- Total: **14 M€**



### TIMING

- Call opening: **7 May 2024**
- Call closing: **5 September 2024**

- *If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).*
- *Projects will be expected to report on results to the EU CCAM Partnership in support of the monitoring of its KPIs.*
- *Actions should be based on methodologies developed in the HEADSTART project, as well as research funded under HORIZON-CL5-2021-D6-01-02.*
- *Links should be established with the Mobility Data Space initiatives from Digital Europe, federated data infrastructure projects (Gaia-X, International Data Spaces, Big Data Value -BDV).*
- *International cooperation with the USA and Japan is encouraged.*

# HORIZON-CL5-2024-D6-01-03

## Orchestration of heterogeneous actors in mixed traffic within the CCAM ecosystem (CCAM Partnership)



### SCOPE (1/2)

To advance on the orchestration of heterogeneous actors in mixed traffic by building on, linking and integrating the following streams of research results and innovation challenges:

- **smart routing** and **interactive traffic management** using connectivity and C-ITS;
- solutions for ensuring the **safety** and **efficiency** of **early CCAM deployment** in the **interaction** of drivers, riders, passengers, traffic participants and automated systems performing driving tasks in **mixed traffic**;
- coherent approach towards **managing fleets** from an **overall system perspective** in real life urban demonstrations of CCAM via **testing** and **demonstrations** in large sets of traffic environments with an emphasis on different fleets that are typically **controlled/supervised/managed** by **heterogeneous** actors;
- new **governance** and **operational models**.

# HORIZON-CL5-2024-D6-01-03

## Orchestration of heterogeneous actors in mixed traffic within the CCAM ecosystem (CCAM Partnership)



### SCOPE (2/2)

- Defining the comprehensive **requirements** (including data exchange) for the **orchestration schemes** with regards to the heterogeneous actors in mixed traffic (automated and non-automated traffic, people and goods and different modes).
- Developing **traffic management tools** that are essential for the coordination of mixed automated and non-automated mobility.
- Defining and demonstrating **business** and **governance models** (including for public actors).
- Developing measures and **KPIs** to demonstrate the **benefits** and added value of **orchestration** for **traffic management** actions (in terms of traffic efficiency, energy efficiency, safety etc.).
- Demonstrating a process that ensures **trust** in the **traffic orchestration** scheme proposed as well as **sufficient accessibility** to quality data for all traffic actors involved and readiness for large-scale demonstration actions.

# HORIZON-CL5-2024-D6-01-03

## Orchestration of heterogeneous actors in mixed traffic within the CCAM ecosystem (CCAM Partnership)



### EXPECTED OUTCOME

- **System approach** towards traffic management that integrates the operations and needs of a wide range of road network users within the mobility ecosystem
- **Safer, more efficient and sustainable** traffic management
- Proven orchestration schemes in traffic management for operations of all types of vehicles and the different CCAM systems in **real-time CCAM traffic conditions in urban and/or motorway environments.**
- Governance and operational models that allow for **better cooperation and collaboration**
- Mobility management tools to **seamlessly integrate CCAM systems and services** including fleets of vehicles, public transport, logistics operations, demand management needs as well as governance and business models into the transport system
- **Strategic transport planning methods** for all modes in the CCAM ecosystem including individual as well as public transport

# HORIZON-CL5-2024-D6-01-03

## Orchestration of heterogeneous actors in mixed traffic within the CCAM ecosystem (CCAM Partnership)



### TYPE OF ACTION

- IA –Innovation Action
- Expected **TRL 6-7** by the end of the project



### EU CONTRIBUTION

- Per project: **6 M€**
- Total: **12 M€**



### TIMING

- Call opening: **7 May 2024**
- Call closing: **5 September 2024**

- *Link to CL5-2024-D6-01-3 - Orchestration of heterogeneous actors in mixed traffic within the CCAM ecosystem (CCAM Partnership)*
- *International cooperation is encouraged, in particular with Japan and the United States but also with other relevant strategic partners in third countries*

# HORIZON-CL5-2024-D6-01-04

## AI for advanced and collective perception and decision making for CCAM applications (CCAM Partnership)



### SCOPE 1/2



- Methods to **establish collective awareness** of CCAM applications that are resilient to faulty sources, thereby ensuring safe operations. Guidance for failsafe designs should be developed.
- Methods to **embed an HI approach** in the entire action chain towards collective awareness to allow for seamless operation and real-time decision-making while enabling **human-like control** of CCAM applications by combining system and domain knowledge (of the vehicle and its technologies on one hand and of the transport environment including all the human interactions on the other, thereby understanding of potential risks and capabilities and needs of other road users).

# HORIZON-CL5-2024-D6-01-04

## AI for advanced and collective perception and decision making for CCAM applications (CCAM Partnership)



### SCOPE 2/2



- **Tooling** to deliver **situational awareness** information in a structured way, based on **multiple sources** and in **real-time**. In addition, the development and integration of **ethical goal functions** to support collective awareness should be included. Work is expected to be based on:
  - Perception systems, sensor fusion, high-level world models/maps, vehicle positioning information. Guidance on common reference systems for positioning and time for synchronisation should be included in order to secure robustness and traceability.
  - Relationships between the vehicle and forecasted intentions of other road users (e.g. a pedestrian crossing the street at a zebra crossing), as such including spatial temporal relation of elements in the driving-situation.



# HORIZON-CL5-2024-D6-01-04

## AI for advanced and collective perception and decision making for CCAM applications (CCAM Partnership)



### EXPECTED OUTCOME 1/2

- Approaches for **resilient collective awareness**, which can eventually be used in e.g. complex models of collective behaviour.
- Advanced **collective awareness, decision making** and triggering of actions for CCAM applications, enabled by new concepts and tools built on advancements in **Artificial Intelligence (AI)**, including **Hybrid Intelligence (HI)**.
- CCAM solutions evolving from **reactive** into **predictive** system state awareness (including driver state and road user diversity), decision making and actuation, enhancing road safety.

# HORIZON-CL5-2024-D6-01-04

## AI for advanced and collective perception and decision making for CCAM applications (CCAM Partnership)



### EXPECTED OUTCOME 2/2

- Understanding of **AI-related ethical issues** and user needs, together with capabilities, limitations and potential conflicts of AI based systems for CCAM, including a definition and a measure of human-like control.
- Increased **user acceptability** and societal benefit of CCAM solutions, based on **explainable, trustworthy, and human-centric AI**. Interactions with AI-based vehicles are understandable, human-like and reflect human psychological capabilities.

# HORIZON-CL5-2024-D6-01-04

## AI for advanced and collective perception and decision making for CCAM applications (CCAM Partnership)



### TYPE OF ACTION

- RIA – Research and Innovation Action
- Expected **TRL 5** by the end of the project



### EU CONTRIBUTION

- Per project: **5 M€**
- Total: **10 M€**



### TIMING

- Call opening: **7 May 2024**
- Call closing: **5 September 2024**

- *If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).*
- *Projects will be expected to report on results to the EU CCAM Partnership in support of the monitoring of its KPIs.*

# HORIZON-CL5-2024-D6-01-05

## Robust Knowledge and Know-How transfer for Key Deployment Pathways and implementation of the EU-CEM (CCAM Partnership)



### SCOPE 1/2

- Identify needs for **targeted content** for specific stakeholder categories and develop content that is **accessible** to non-experts, supporting **capacity building** of the public. The proposed action should define the above-mentioned stakeholder categories and develop a subsequent **communication strategy** using realistic and accessible terms to address different target groups.
- Provide effective **dissemination** and **concertation mechanisms** and means for the stakeholder community to enable the **exchange** of **experiences** and **practices**, stimulate collaboration and cooperation between CCAM stakeholders and reach **consensus** on future R&I needs within the CCAM Partnership.
- Facilitate the work of the **CCAM SRG** and **stimulate** the **cooperation** between EU Member States/Associated Countries. Provide an analysis of initiatives in EU Member States/Associated countries and support the SRG in identifying areas for R&I cooperation.

# HORIZON-CL5-2024-D6-01-05

## Robust Knowledge and Know-How transfer for Key Deployment Pathways and implementation of the EU-CEM (CCAM Partnership)



### SCOPE 2/2

- Ensure **representation** of **EU stakeholders** in **international cooperation**, information exchange and harmonisation initiatives on CCAM. Provide a global output on CCAM activities to support the development of European agendas by exploring potential opportunities and R&I domains for international cooperation.
- Continue to **evaluate** and **update** the **EU-CEM** with EU Member States/Associated countries to ensure alignment with national strategies and regulations, looking at national and regional transport and mobility data to ensure compatibility.
- Support the practical **implementation** of the **EU-CEM** (for existing and innovative use cases) and provide **training programmes** for CCAM projects to integrate the methodology.
- Assess the level of **awareness**, **attitudes** and **intention** to use CCAM of European citizens, decision- and policy makers through regular **surveys** and **workshops**. Results should be published in the Knowledge Base and mechanisms should be provided to integrate findings into the EU-CEM. This action should be grounded in a co-creative process.

# HORIZON-CL5-2024-D6-01-05

## Robust Knowledge and Know-How transfer for Key Deployment Pathways and implementation of the EU-CEM (CCAM Partnership)



### EXPECTED OUTCOME

- **Extended and updated CCAM Knowledge Base**, incl. CCAM projects, demonstration and deployment initiatives, standards, facilitating the exchange of best practices and the deployment of CCAM services, together with a well **established network of experts** and forum for stakeholders.
- Strong **collaboration** and **cooperation** between all **CCAM stakeholders** through effective collaboration mechanisms fostering exchanges of practices, experiences, tools and methodologies supporting the transition to large-scale deployment.
- **Increased and high-quality** exchanges and cooperation between the EU **Member States/Associated countries**.
- **EU CCAM common evaluation methodology (EU-CEM) widely used** in Europe.
- Good level of **understanding** and **awareness** of **CCAM** among citizens, decision and policy makers in Europe.

# HORIZON-CL5-2024-D6-01-05

## Robust Knowledge and Know-How transfer for Key Deployment Pathways and implementation of the EU-CEM (CCAM Partnership)



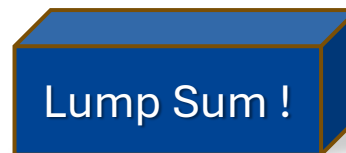
### TYPE OF ACTION

- **CSA** – Coordination and Support Action



### EU CONTRIBUTION

- Per project: **4,5 M€**
- Total: **4,5 M€**



### TIMING

- Call opening: **7 May 2024**
- Call closing: **5 September 2024**

- *If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).*
- *Projects will be expected to report on results to the EU CCAM Partnership in support of the monitoring of its KPIs.*
- *International cooperation with the USA and Japan is encouraged.*

# #HorizonEU

<http://ec.europa.eu/horizon-europe>



© European Union 2023

Unless otherwise noted the reuse of this presentation is authorised under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/) license. For any use or reproduction of elements that are not owned by the EU, permission may need to be sought directly from the respective right holders.

Image sources: ©ivector, #235536634, #241215668, #244690530, #245719946, #249868181, #251163013, #251163053, #252508849, #266009682, #273480523, #362422833, #222596698, #333945171, #225172715, #225172828, #298595650, #292684095, #318273051, #357709743, #261604727, #261604828; ©Hanna, #343035399; ©pavelvinnik, #265065833; 2020/21. Source: Stock.Adobe.com

