CCAM

EC CCAM Single Platform, CCAM Partnership, CCAM Association, CCAM SRIA, and the Horizon E

27.04.2021 Per J. Lillestøl

CCAM History in 1-2-3

In 2019 European Commission (R&I, Move, CNECT, GROW) lounge and managed **CCAM Single Platform**.

"planning of research and pre-deployment programmes"

Several working groups, ERTRAC involved in organizing

Late 2019 EU Commission published *"Orientations towards the first Strategic Plan for Horizon Europe"*

This plan described the model of Partnership for various subjects for the upcoming Framework Program – Horizon Europe

In February 2020 European Commission invited to *"Stakeholder workshop on CCAM Partnership"* in Brussels.

Several working groups was organised and ERTRAC was involved in organising.

This was the start of CCAM Partnership

History part 2

During 2020 the CCAM Partnership organised the work in 7 Clusters (groups) an invited to a series of workshops with the aim of drafting a Strategic Research and Innovation Agenda (SRIA). A plan of important topics for further R&D.

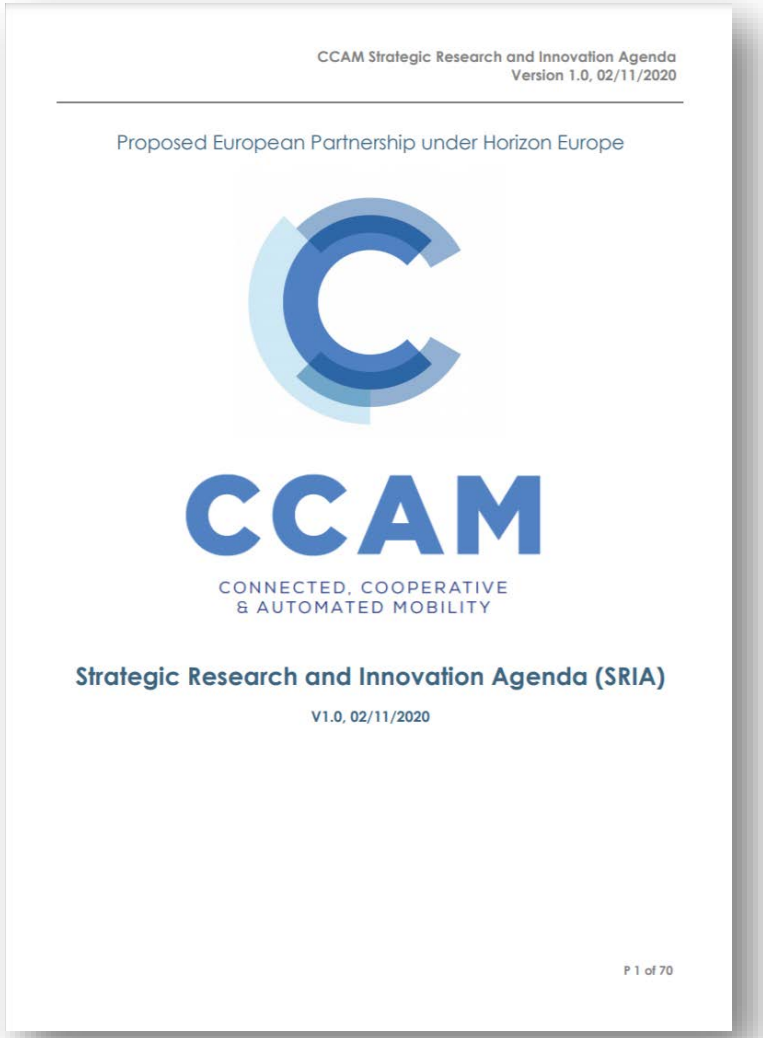
The work with SRIA was finalised in November 2020 and sent to the European Commission.

The **CCAM Association** is a legal entity registered in Brussels, (to have an organizational number and bank account etc.) and signs the CCAM Partnership agreement with the European Commission.

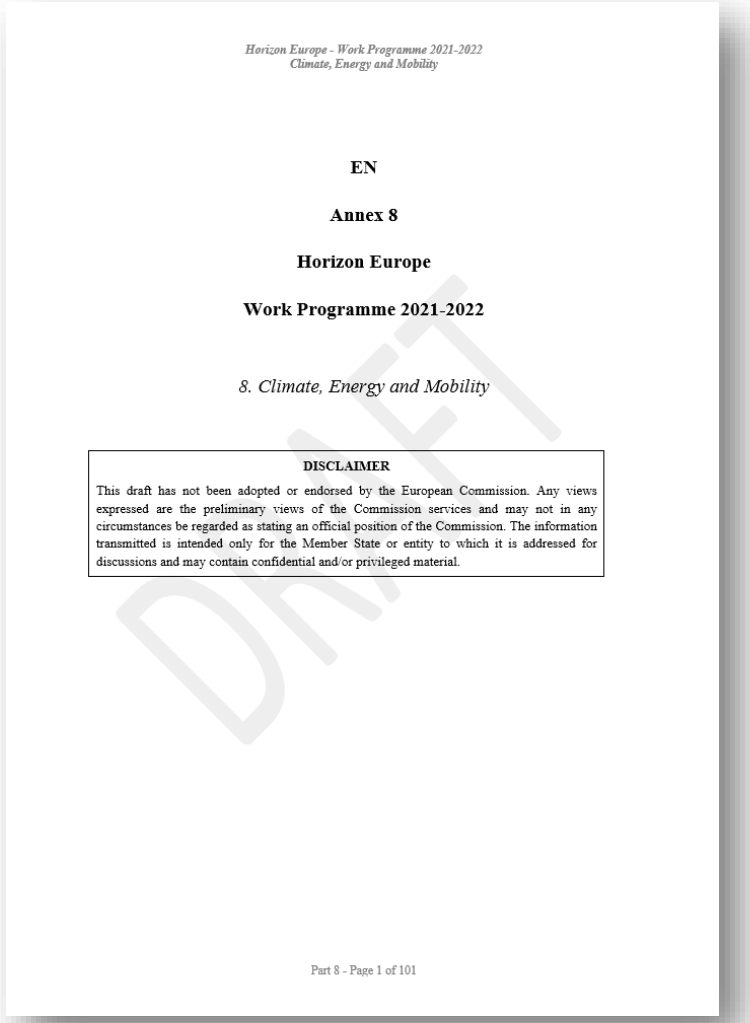
CCAM Partnership had the first General Assembly in April 2021 and started with 144 members.

The CCAM Partneship will develop further the SRIA and make recommendations to the European Commission. for the next topics to be funded by the Partnership.

From CCAM Partnership to Horizon Europe Work Program



European Commission



Increase safety in road transport

Reduce negative impacts from road transport on environment

Strengthen competitiveness of European industries

Ensuring inclusive mobility and goods access for all

CCAM

CONNECTED, COOPERATIVE & AUTOMATED MOBILITY

European leadership in safe and sustainable road transport through automation

CCAM Vision and Expected Impacts

With full integration of CCAM in the transport system, the **expected positive impacts** for society will be:

- **Safety**: Reducing the number of road fatalities and accidents caused by human error;
- **Environment**: Reducing transport emissions and congestion by optimising capacity, smoothening traffic flow and avoiding unnecessary trips;
- **Inclusiveness**: Ensuring inclusive mobility and goods access for all; and
- **Competitiveness**: Strengthen competitiveness of European industries by technological leadership, ensuring long-term growth and jobs.

The Vision of the Partnership is: European leadership in safe and sustainable road transport through automation

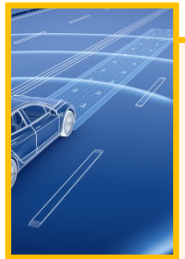
Challenges

The Vision is hindered by several Problem Drivers that must be tackled:

- (PD1) **Insufficient demand** as society is not yet prepared to accept the transition to CCAM enabled mobility. Potential implications and impacts of integration of CCAM solutions into the mobility system are not well understood.
- (PD2) CCAM solutions are **not yet sufficiently mature for market take-up**, and current investment levels in CCAM R&I are inadequate to maintain and extend EU industrial leadership.
- (PD3) Current **R&I efforts are fragmented** and lack a coherent, longer-term vision and strategy.
- (PD4) **Demonstration and scale-up is limited**, since a well organised, large and complex, cross-sectorial value chain is still required to build complete CCAM solutions.

CCAM General Objectives

Reduced number of fatalities and injuries in road transport



Safe and efficient co-existence between automated and non-automated “conventional” traffic for a long transition period of mixed traffic

High public acceptance and adoption of CCAM with clear understanding of its benefits and limits

Increased efficiency of transport flows (people and goods) leading to better use of infrastructure capacity and preservation of public space

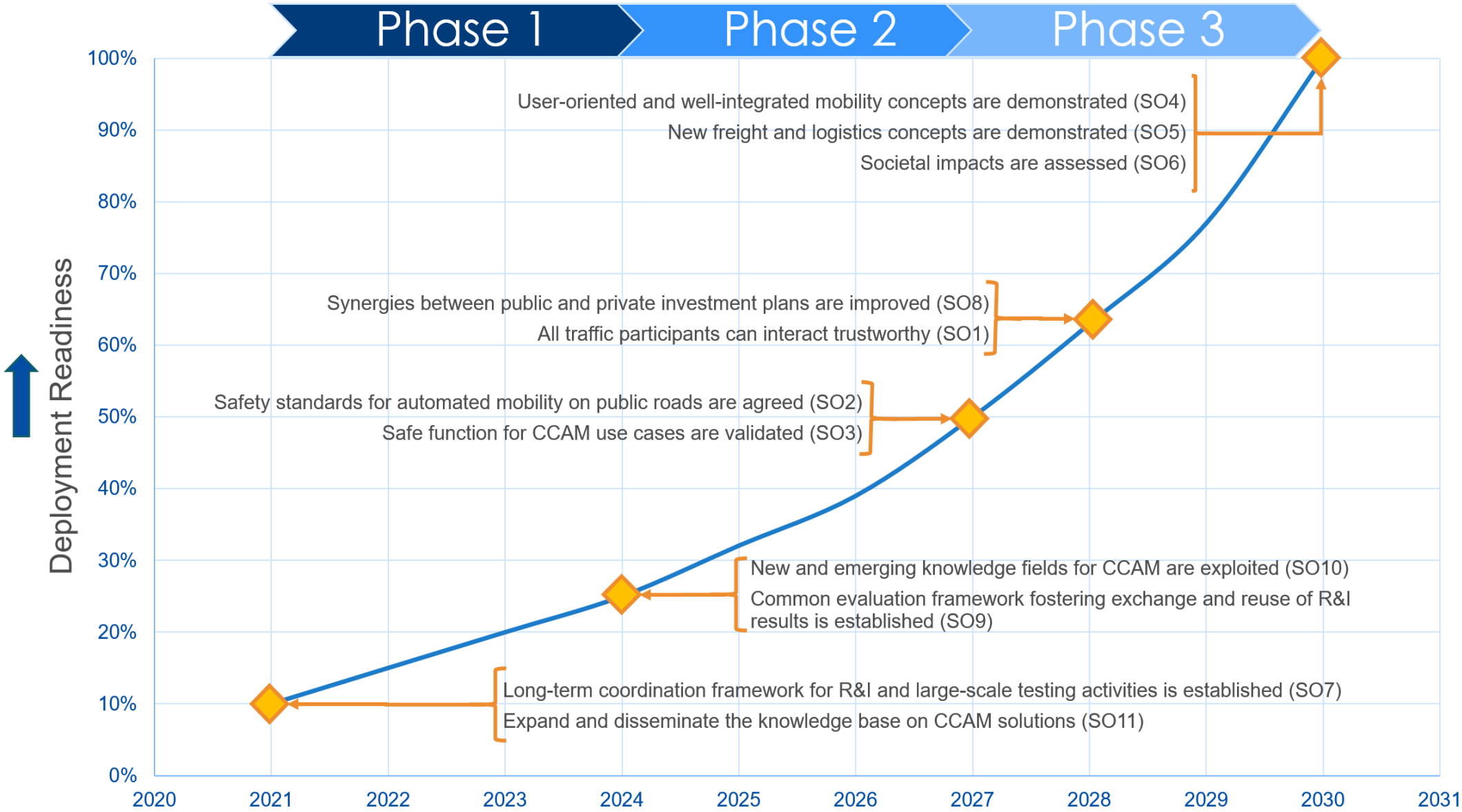
Reduced transport emissions and congestion

Making Europe a world leader in the deployment of connected and automated mobility for people and goods

More focused and long-term investments in R&I, development and pre-deployment of CCAM

Support the creation, dissemination and capitalisation of knowledge to accelerate the development and improvement of CCAM enabled solutions

CCAM Partnership Implementation

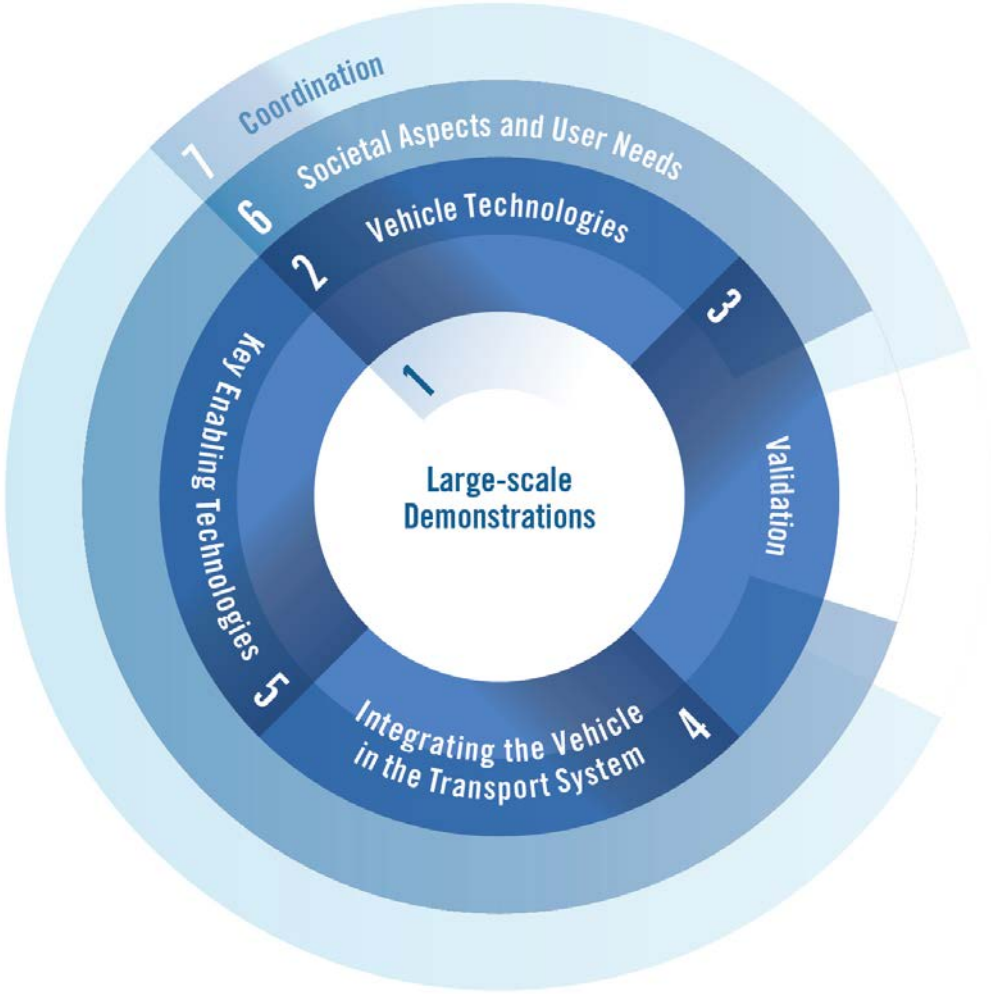


CCAM Clusters

Successful implementation requires understanding:

- the **user needs and societal aspects** of mobility
- technical details, contributions, requirements and risks from **key enabling technologies**
- the overall **transport system** requirements and set-up
- what **vehicle technologies** are required and how to implement them
- how to **validate** safe system functioning

Finally **demonstrate** all aspects at a **large scale**



Cluster 1: Large-Scale Demonstrations

Objective:
ensure that the **results of all other Clusters** are capitalised and implemented, in

- **Pilots** (first use cases, limited ODD), in
- **FOTs** (more use cases, extended ODD) and in
- **Living Labs** (many use cases combined, wide ODD)

to support **deployment readiness** and a final **impact assessment**.

Cluster 1: Large-Scale Demonstrations

- **Pilots** include connectivity and infrastructure, test the combination of many fragmented technological enablers in their combination.
- **Field Operational Trials (FOTs)** further enhance user acceptance by testing user functionality closer to deployment.
- **Living Labs** build on small-series-built vehicles that include fully integrated functionality and user interface as well as resilient connectivity and reliable external data, operated by mature traffic management systems.

Specific Objective	• Demonstrate inclusive, user-oriented and well-integrated mobility concepts enabled by CCAM with a reduced carbon footprint and reliable predicted travel times • Demonstrate new freight and logistics concepts and services enabled by CCAM with a reduced CO2 emission per tonne-km, further reducing congestions • Societal impacts (e.g. safety, efficiency, environment) and wider economic impacts are sufficiently assessed, addressed and accepted

Cluster 2: Vehicle technologies

- Tomorrow’s highly automated vehicles will rely on advanced solutions to ‘sense-think-act’, enabling safe interaction with other road users and providing protection in the case of emergency.
- It essential is to ensure the safety of all road users, and the well-being of the vehicle occupants.
- The aim is to deliver the most efficient and effective future solutions which have been proven to be safe and reliable.
- Significant technical challenges must be overcome through focused, applied research and innovation.

Cluster 2: Vehicle technologies

R&I Actions

- 2.1 - Environment perception technologies for CCAM
- 2.2 - Safe and reliable on-board decision-making technologies
- 2.3 - Preventive and protective safety for highly automated vehicles
- 2.4 - Human Machine Interfaces development for CCAM on-board technology
- 2.5 - Addressing User-Centric Development of CCAM

Specific Objective	• Secure and trustworthy interaction between road users, vehicles, infrastructure and services • Agreed safety standards for highly automated driving systems to operate and function on public roads

Cluster 3: Validation

- Assuring the effective safety of CCAM will be crucial for its acceptance and adoption in society.
- Conventional validation approaches would require hundreds of millions of test kilometres for higher levels of automation.
- This Cluster will provide the procedures, methodologies and tools which are needed for validating, verifying and rating CCAM systems combining physical and virtual testing.
- This will include suitable metrics and references for system behaviour and performance, covering both technology itself and human factors.

Cluster 3: Validation

R&I Actions

- 3.1 - Future-proof methodologies and tools for validation
- 3.2 - EU wide database of relevant scenarios for validation
- 3.3 - Human Reference for Automated Driving
- 3.4 - Specific HMI testing and validation procedures, methods and tools for higher levels of automation

Specific Objective	• Secure and trustworthy interaction between road users, vehicles, infrastructure and services • Agreed safety standards for highly automated driving systems to operate and function on public roads • Validated safety of the intended functions for CCAM use cases

Cluster 4: Integrating the vehicle in the transport system

- Interaction with infrastructures (road, telecommunication, automotive backend) crucial for the success of the system integration,
- Research on infrastructure(s) important, building a common understanding of what is required, how it can be achieved, and which roads should be prioritised,
- Advances on methodologies, tools and applied safe and secure technologies, as well as governance and architecture issues, all to benefit interoperability,
- Longer investment cycles of road infrastructure and budgetary processes of public actors comprises challenge to identify no-regret infrastructure investment in support of enlarging Operational Design Domains (ODD) of CCAM vehicles.

Cluster 4: Integrating the vehicle in the transport system

R&I Actions

- 4.1 - Fleet and Traffic Management
- 4.2 - Physical and Digital Infrastructure
- 4.3 - Connectivity and Cooperative Systems

Specific Objective	• Secure and trustworthy interaction between road users, vehicles, infrastructure and services • Improved synergies between public and private investment plans to advance vehicle and infrastructure technologies

Cluster 5: Key Enabling Technologies

- Focus: enabling technologies, driven by digitalization & extending the domain beyond the individual vehicle → system's approach.
- Essential: cooperation amongst stakeholders from several technology areas and industries.
- Safe and secure operation of vehicles and mobility systems is key to develop trust and establish user adoption of CCAM solutions
- Develop harmonised approaches in further developing and incorporating technologies artificial intelligence, cyber security and data sharing, plus a basis for methods and tools for their training and validation

Cluster 5: Key Enabling Technologies

R&I Actions

- 5.1 - Cybersecure components and systems
- 5.2 - Robustness and resilience
- 5.3 - Explainable concepts and training of AI for CCAM applications
- 5.4 - AI for situational awareness
- 5.5 - System architecture for data sharing

Specific Objective	• Secure and trustworthy interaction between road users, vehicles, infrastructure and services • Inclusion of new and emerging knowledge fields addressing user needs and wide industrial application CCAM solutions

Cluster 6: Societal aspects and user needs

- Successful deployment of CCAM depends largely on the societal benefits it can generate and on the uptake by individual users.
- To achieve desired benefits, CCAM development, deployment and regulation have to build on a well-founded knowledge of needs, impacts and costs.
- This Cluster delivers, to sister clusters, the framework for understanding and taking into account needs, expectations, concerns and desires of future users, citizens, and society at large.
- Comprehensive impact assessment methods that cover the full range of effects of CCAM systems and services will be provided.
- The Cluster aims to involve a wide range of stakeholders and disciplines.

Cluster 6: Societal aspects and user needs

R&I Actions

- 6.1 - Socio-economic and environmental impact analysis
- 6.2 - Societal needs analysis
- 6.3 - Workforce development

Specific Objective	• Societal impacts (e.g. safety, efficiency, environment) and wider economic impacts are sufficiently assessed, addressed and accepted

Cluster 7: Coordination

- Coordination of R&I and testing activities across EU is required to address the current fragmentation of R&I efforts and the lack of a coherent, longer-term vision and strategy.
- Harmonised approaches, common methodologies and tools to facilitate exchanges will support the collaboration across the complex cross-sectorial CCAM value chain
- This Cluster is coordinating all CCAM stakeholders and activities, facilitates knowledge exchange und enables lessons learned.
- EU frameworks for the assessment of impacts of CCAM technologies, systems and services, testing on public roads and sharing of Test data will be developed.
- The EU-wide Knowledgebase will be extended and a stakeholder forum created.

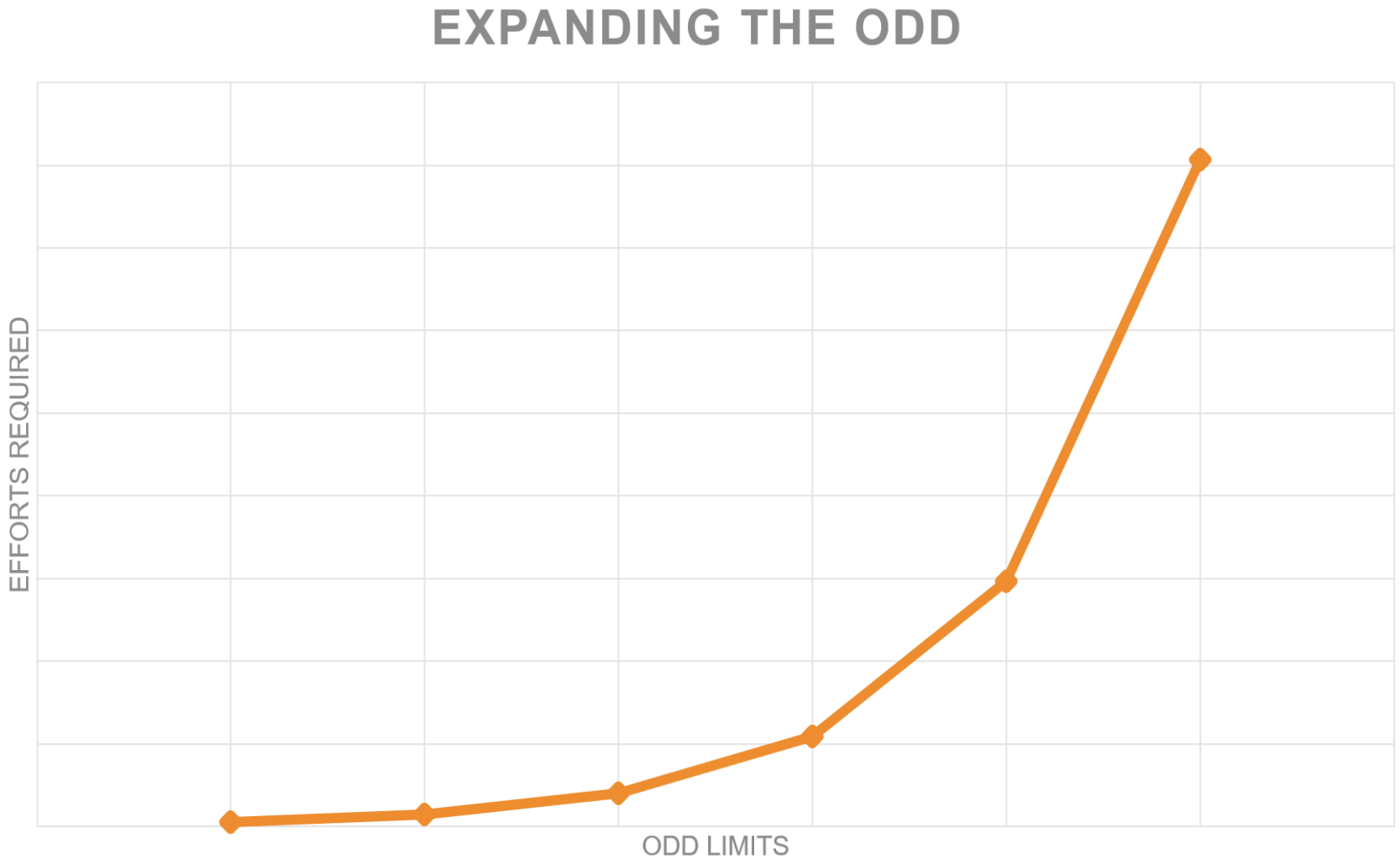
Cluster 7: Coordination

R&I Actions

- 7.1 - EU-wide knowledge base
- 7.2 - Common Evaluation Methodology
- 7.3 - Test Data Exchange Framework
- 7.4 - European Framework for Testing on Public Roads

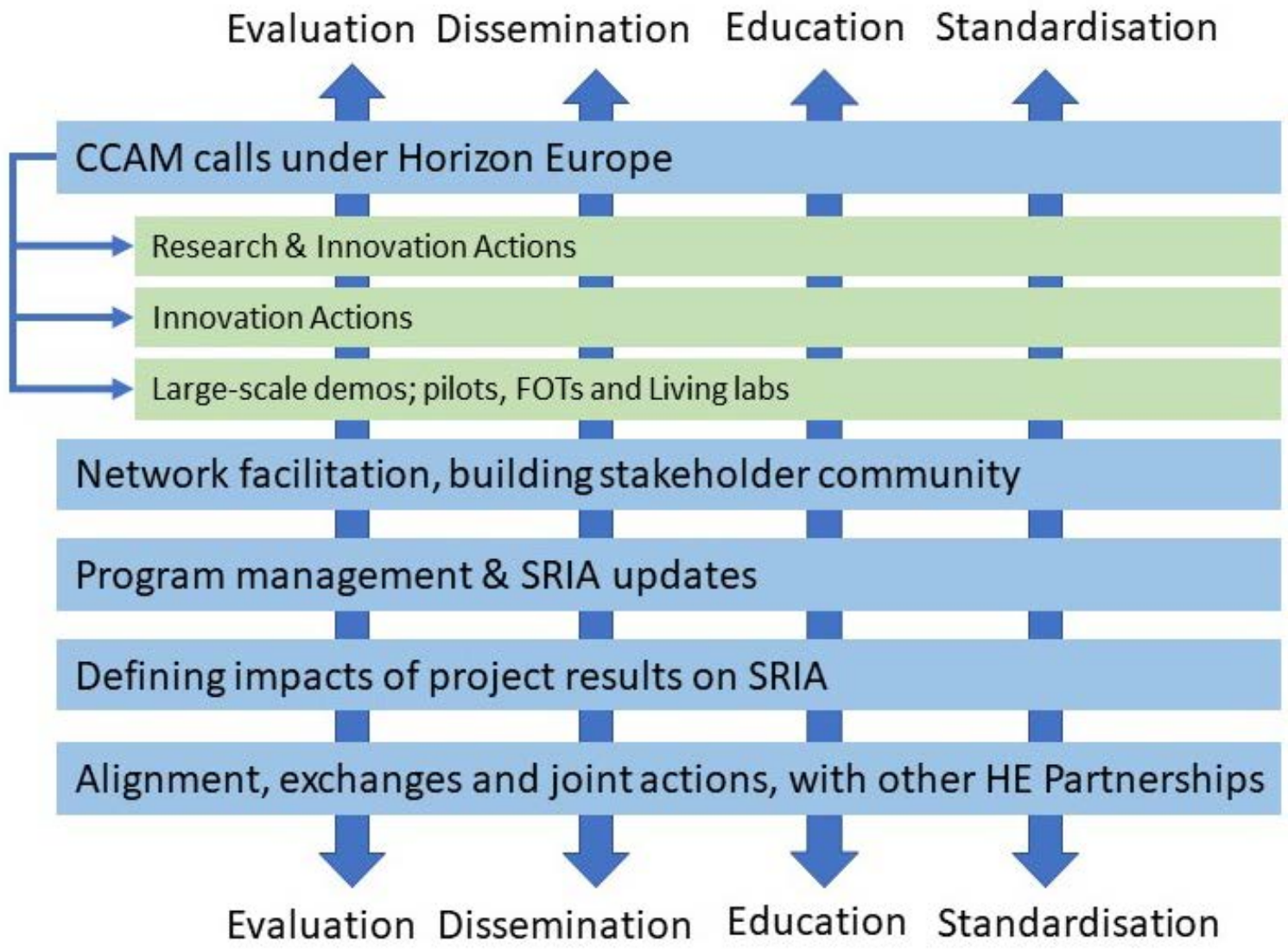
Specific Objective	• Long-term coordination framework for R&I and large-scale testing activities, involving all relevant public and private stakeholders from European, national and regional levels • Expand and disseminate the knowledge base on CCAM solutions, stakeholders, R&I programmes and projects, and testing activities

CCAM Partnership Implementation:
Use Cases and deployment readiness

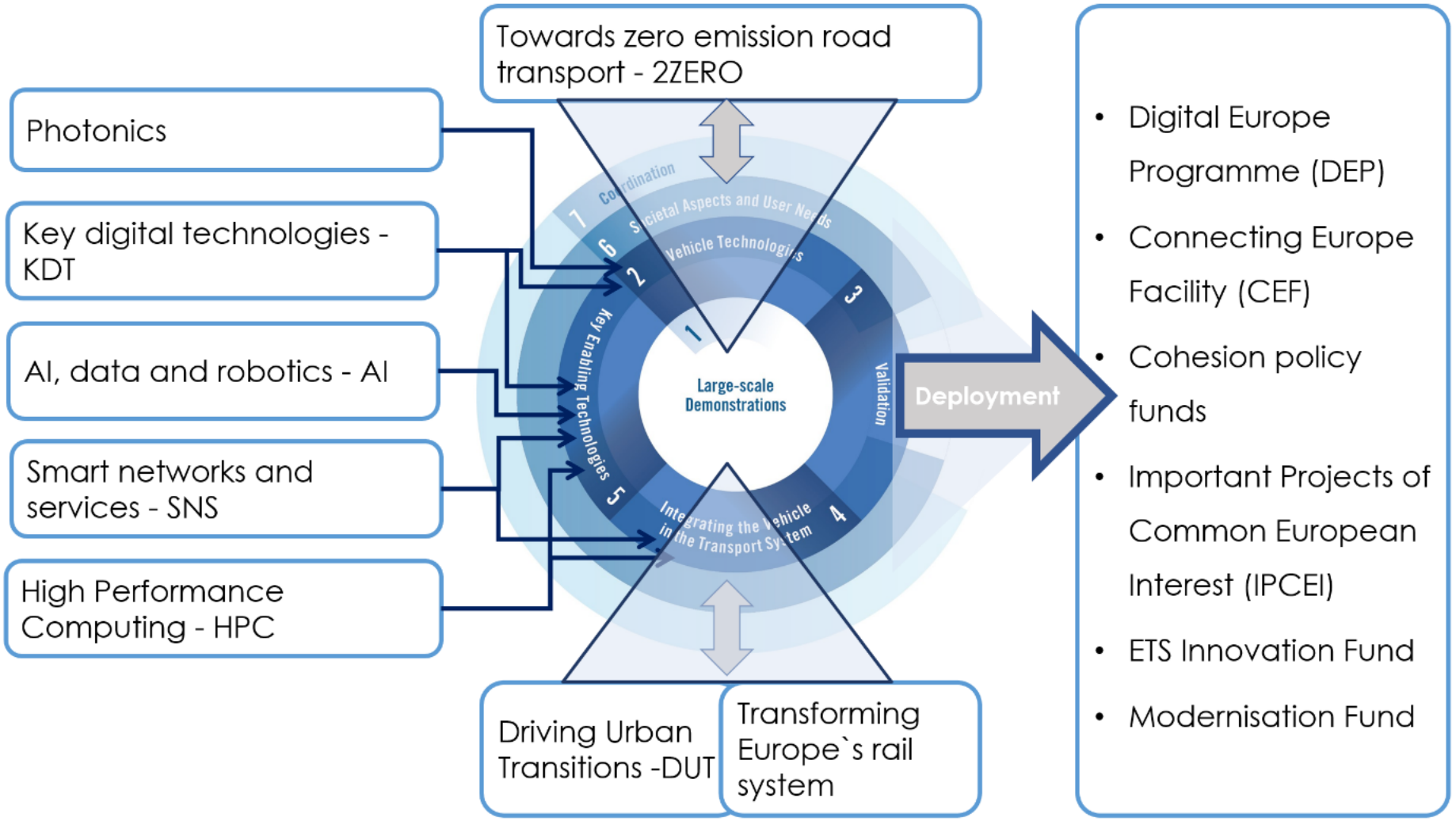


Increasing the ODD size will require significant more development efforts.

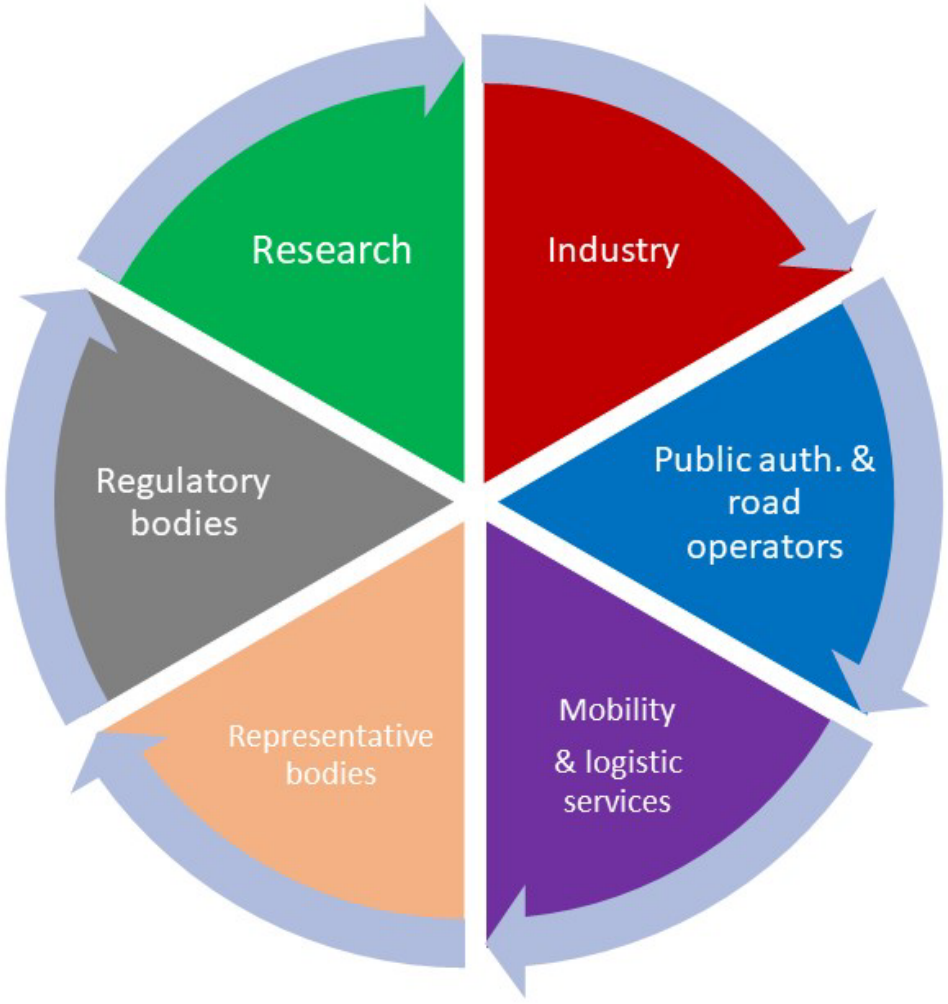
CCAM Partnership Implementation: Activities



CCAM Partnership Implementation:
Coordination with other Partnerships in Horizon Europe and other EU activities



CCAM Partnership Implementation:
Involvement of Sectors and Stakeholders



Industry	- Automotive industry, including supply chain - ITS solutions, telecom providers, connectivity - Data handling and storage industry, ...
Public authorities & road operators	- Cities and regions - Transport authorities, road authorities and operators - Member States
Mobility & logistic services	- Public transport providers - Mobility and logistics service providers - Insurance, maintenance, ...
Representative bodies	- Road users - Stakeholder associations - Road safety, society, the environment, ...
Regulatory bodies	- National, European and international
Research	- Universities - Public research institutes - Private research institutes

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