CCAM

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& AUTOMATED MOBILITY

Cluster 5 “KET“ inputs to Large-Scale Demonstrations

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Projects in Cluster 5

There are 5 projects which have emerged from call topics prepared by Cluster 5:

- **CONNECT** “Continuous and Efficient Cooperative Trust Management for Resilient CCAM”
  (01/09/2022 – 31/08/2025), coordinated by TECHNIKON
- **SELFY** “SELF assessment, protection & healing tools for a trustworthY and resilient CCAM”
  (01/06/2022 – 31/05/2025), coordinated by Fanny Breuil, Eurecat
- **AITHENA** ”AI-based CCAM: Trustworthy, Explainable, and Accountable”
  (01/11/2022 – 31/10/2025), coordinated by Oihana Otaegui, Vicomtech
- **AI4CCAM** “Trustworthy AI for CCAM”
  (01/11/2022 – 31/10/2025), coordinated by Arnaud Gotlieb, Simula
- **SYNERGIES** “Real and synthetic scenarios generated for the development, training, virtual testing and validation of CCAM systems”
  (01/06/2024 – 31/05/2027), coordinated by Jordi Pont, IDIAP

Just started!

See Cluster 3

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Expected Outcomes from CONNECT and SELFY

Expected outcomes according to WP 2021/2022:

- Safe and secure operation of CCAM vehicles and mobility systems and services, enhancing trust and end user adoption of CCAM solutions.
- Cybersecurity requirements including data security and access control enabling harmonised approaches and tools for data sharing.
- Improved understanding of the new, emerging and specific CCAM related cyber security and resilience challenges, by using the contextual definition, including sector specific security features.
- Inclusion of cybersecurity and resilience as an integral part into the development process of CCAM solutions by OEMs, Tiers, telecom providers and service providers, with common aims and objectives, frameworks/architectures and designs.
- Cybersecure data sharing approaches from pilot applications towards CCAM on a harmonised larger scale.

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Expected Outcomes from AITHENA and AI4CCAM

Expected outcomes according to WP 2021/2022:

- Concepts, techniques and models based on Artificial Intelligence (AI) used for situational awareness, prediction, decision making and triggering of actions for time critical and safety relevant CCAM applications as well as for cyber threat detection and mitigation.
- A clear understanding of the capabilities, limitations and potential conflicts of AI based systems for CCAM.
- Increased user acceptance from an early stage, based on explainable, trustworthy and human-centric AI. Interactions with vehicles using AI should be understandable, humanlike and reflect human psychological capabilities, and free of gender, ethnic or other biases.
- Accelerated AI development and training for CCAM enabled by a relevant set of real and synthetic traffic events and scenarios.
- AI based CCAM solutions will evolve from reactive and/or adaptive system support into predictive system state awareness (including driver state and user diversity), decisionmaking and actuation, enhancing road safety especially in near-critical situations.

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Conclusions from Expected Outcomes

- CONNECT, SELFY, AITHENA, AI4CCAM and SUNRISE are primarily expected to support:
  - R&I and system design and methodologies for safe and secure operation of CCAM solutions
  - Concepts, methodologies and tools for advanced perception for CCAM
  - AI for CCAM training, data annotation, scenario definition
  - User acceptance
  - Type approval schemes
  - Safety rating in consumer testing campaigns (like Euro NCAP)

→ Link to Large-scale Demonstrations

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CONNECT: Expected Outcomes → Project Results → their Integration in LSD

- Expected project results:
  - Trust Assessment Framework: Continuously evaluates the trustworthiness of data and data sources, ensuring trustworthy information for CCAM decision making
  - Advanced crypto-primitives for privacy-respecting exchange of trust-related information across CCAM actors
  - Digital Twin to support efficient, continuous trust assessment in large-scale CCAM environments
- How can project results be scaled up, how can they be building blocks in Large-Scale Demonstrations?
  - Ensuring Trustworthy Data Sharing at Scale: In large-scale CCAM pilots, CONNECT's Trust Assessment Framework (TAF) ensures that data from various CCAM stakeholders – vehicles, infrastructure, service providers – can be assessed, validated and trusted. This can unlock Day-2 and Day-3 CCAM services, by enabling autonomous systems(i.e. ADAS) to use data they receive through V2X from other vehicles.
  - CONNECT's TAF can be a catalyst in order to enable trustworthy AI in CCAM. By providing a framework that assesses the trustworthiness of vehicle data, it ensures that AI models developed for CCAM are trained on data that meets stringent quality and reliability requirements.
  - CONNECT's output can be directly applicable to the creation of interoperable data spaces, enabling seamless data sharing across diverse CCAM environments. This allows large-scale pilots to seamlessly integrate diverse data sources, ensuring that AI models are trained on interoperable, high-quality data.

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From Expected Outcomes to Project Results and their Integration in Large-scale Demonstrations

Innovative collaborative tools responding threats, risks and attacks in the domain of cybersecurity of CCAM

1 Situational Awareness and Collaborative Perception (SCAP)

Set of tools to obtain a comprehensive understanding of the environment of the different assets or devices of a CCAM system.

2 Cooperative Resilience and Healing System (CRHS)

Tools that will elicit self-protection actions whenever a compromised situation is detected in relation to assets, vehicles, operations, or the system itself.

3 Trust Data Management System (TDMS)

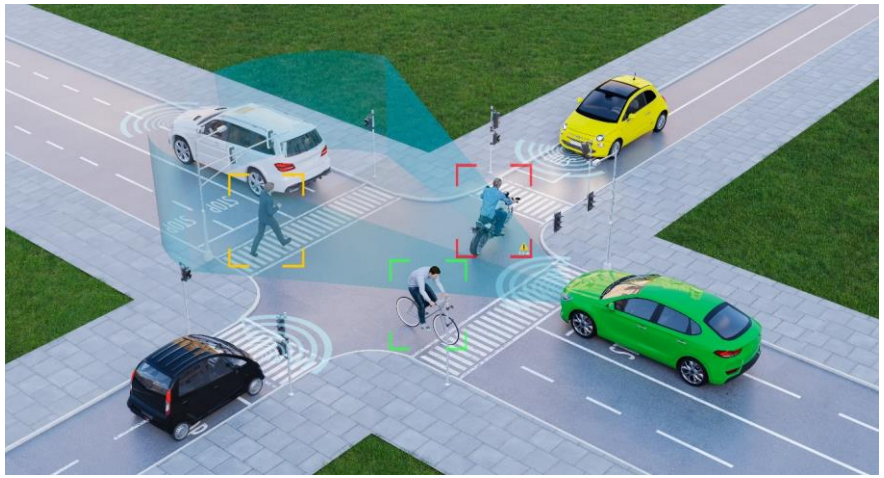
Tools to build a secured and trusted environment for data in a collaborative and cooperative context, both for infrastructure and assets, as well as for people's data, such as drivers or pedestrians.

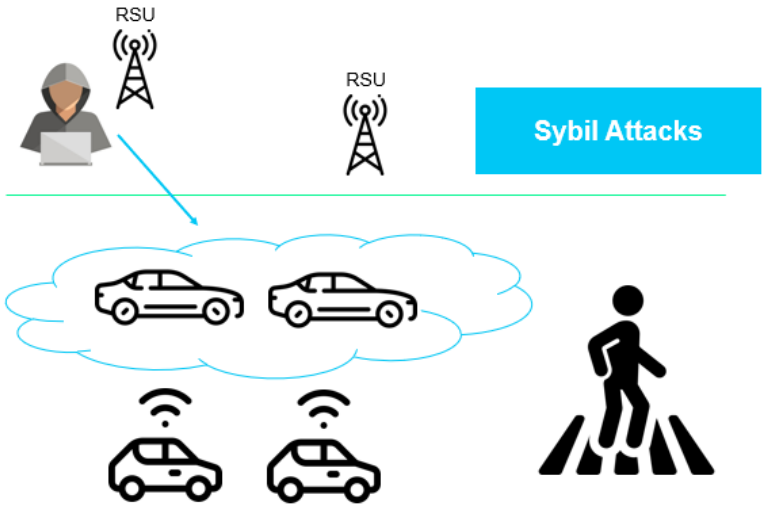
- Other project results:
  - Cybersecurity requirements for a complete CCAM cybersecurity solution considering vehicles, infrastructure and cloud.
  - SELFY dataset comprising the Real-world Validation scenarios
  - Set of recommendations and gaps to current CCAM standards

From Expected Outcomes to Project Results and their Integration in Large-scale Demonstrations

- Potential users: OEMs/suppliers (e.g. Audi, FICO…), traffic management centres (e.g. Vienna, Bordeaux), infrastructure managers (e.g. ABERTIS, VINCI), large companies (adoption of VSOC: e.g. Upstream Security, NTT Data; cameras for infrastructure: CANON), Service providers (e.g. maintenance, fleet operators, etc).

- How can project results (TR6) be scaled up, how can they be building blocks in Large-Scale Demonstrations?
  - SELFY tools can work all together, but it is also possible to select a batch of tools from the three macro tools (SACP, CRHS, TDMS) providing flexibility in a large-scale demonstration.
  - Our Scenarios have 5-10 elements (2-3 vehicles, 1-5 RSUs, 1 VSOC). Next steps: more interconnected RSUs, more vehicles from different OEMs with different techs, test more situations of ODD, …
  - The VSOC can be scaled up according to the number of users. Receives 10-20 requests per second; in real-word, it would receive millions: how to handle this information? Also data privacy concerns.
  - Tools have to be integrated in vehicles, RSU or cloud systems. Each system has their own hardware, software and protocols. It can be a hard work regarding integration.
  - To avoid problems with interoperability (e.g. data sharing), we need to push on standardisation and regulation topics.
  - New Cyber Resilience Act (CRA) + automotive UN Regulation No. 155 (vehicle). Infrastructure, and whole CCAM system
  - (how shall we audit the whole CCAM ecosystem?)





AITHENA: Expected Outcomes → Project Results → their Integration in LSD

- Expected project results:
  - Methodology for trustworthy AI based system/function inclusion on CCAM
  - Real Time Data Anonymizer Module for GDPR compliance without impacting on recorded images
  - Trustworthy AI models
    - AI approaches for in vehicle systems perception and decision making
    - AI approaches towards trust on Traffic Level Decision Making
  - Datasets
- How can project results be scaled up, how can they be building blocks in Large-Scale Demonstrations?
  - AITHENA Methodology
    - Ensure the trustworthiness of any AI systems on Large Scale
      - Data, Model, Testing -> Explainability, Ethics, …
  - Trustoworthy AI models/function in vehicle and/or RSU (infrastructure) – control centre
  - Test Data managent tools – GDPR compliant

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AI4CCAM: Expected Outcomes → Project Results → their Integration in LSD

- Expected project results:
  - Methodology inputs to integrate EU Trustworthy AI guidelines in CCAM applications;
  - AI4CCAM road scenarios with ethical issues, modelled in MOSAR;
  - AI4CCAM participatory space, including initial discussions on

    1. Fairness, Diversity and Inclusion in CAVs; 2. Sharing Road Space: Public Transport and CAVs; 3. Fostering cybersecurity in CCAM and 4. Ensuring Transparency in Industry Communication to strengthen the CCAM trustworthiness;
  - Research results on qualitative scene understanding, pedestrian and vehicle trajectory prediction model definition and validation;
- How can project results be scaled up, how can they be building blocks in Large-Scale Demonstrations?
  - AI4CCAM qualitative scene understanding can be a building block for a LSD on collective awareness in road monitoring and control;
  - AI4CCAM scenarios can serve as a basis for large-scale demonstrations of ethical issues on the road;
  - AI4CCAM participatory space can serve, as part of large-scale demonstrations, to increase user acceptance of AD by EU citizen

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Time for action

1.How can results from Cluster 5 projects feed Large Scale Demos which do contribute to meaningful services that address people needs and meet societal targets?

2.What knowledge/tools/… from key enabling technologies are missing, in order to scale up to LSD effectively/optimally?

- 5 minutes → 15 mins discussion
- Write so we can read + your name so we can ask if needed afterwards.

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