Althena

D6.5 Report on dissemination and standardisation activities

Dissemination level	Public (PU)
Work package	WP6
Task:	T6.2 – T6.3
Deliverable lead:	FIA
Version	V1.0
Submission date	24/10/2025
Due date	31/10/2025

Authors

Authors in alphabetical order		
Name	**Organisation**	**Email**
Beckmann, Justyna	FIA	jbeckmann@fia.com
Shinde, Bharat	VALEO	bharat.shinde@valeo.com

Control sheet

Version history			
Version	**Date**	**Modified by**	**Summary of changes**
V0.1	22/05/2025	J. Beckmann	Draft version
V0.2	23/09/2025	J. Beckmann	Updated version
V0.3	10/10/2025	B. Shinde	Updated version
V0.4	13/10/2025	J. Beckmann	Version ready for internal review
V1.0	23/10/2025	J.Beckmann	Version ready for submission

Peer review		
	Reviewer name	**Date**
Reviewer 1	Ilaria Andreazzoli, TNO	20/10/2025
Reviewer 2	Anton Wijbenga, MAPTM	17/10/2025

Disclaimer

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

This work has received funding from the Swiss State Secretariat for Education, Research, and Innovation (SERI).

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

1. Introduction

1.1. AIthena concept and approach

Connected, Cooperative and Automated Mobility (CCAM) solutions have emerged thanks to novel Artificial Intelligence (AI) which can be trained with huge amounts of data to produce driving functions with better-than-human performance under certain conditions. The race on AI keeps on building HW/SW frameworks to manage and process even larger real and synthetic datasets to train increasingly accurate AI models.

However, AI remains largely unexplored with respect to explainability (interpretability of model functioning), privacy preservation (exposure of sensitive data), ethics (bias and wanted/unwanted behaviour), and accountability (responsibilities of AI outputs). These features will establish the basis of trustworthy AI, as a novel paradigm to fully understand and trust AI in operation, while using it at its full capabilities for the benefit of society.

AIthena will contribute to build Explainable AI (XAI) in CCAM development and testing frameworks, researching three main AI pillars: data (real/synthetic data management), models (data fusion, hybrid AI approaches), and testing (physical/virtual XiL set-ups with scalable MLOps).

A human-centric methodology will be created to derive trustworthy AI dimensions from user identified group needs in CCAM applications. AIthena will innovate proposing a set of Key Performance Indicators (KPI) on XAI, and an analysis to explore trade-offs between these dimensions.

Demonstrators will show the AIthena methodology in four critical use cases: perception (what does the AI perceive, and why), situational awareness (what is the AI understanding about the current driving environment, including the driver state), decision (why a certain decision is taken), and traffic management (how transport-level applications interoperate with AI-enabled systems operating at vehicle-level).

Created data and tools will be made available via European data sharing initiatives (OpenData and OpenTools) to foster research on trustworthy AI for CCAM.

1.2. AIthena consortium

The AIthena consortium consists of 17 partners from 6 different EU countries, and 1 associated partner from Switzerland, who gather all the necessary background and expertise to achieve the objectives of the project. Furthermore, as a Research and Innovation Action (RIA), a balance mix of partners has been selected for provisioning the research, expertise and technology required to meet the project objectives:

- research partners (VICOM, IKA, TUE, VIF, TNO, BUW),
- technology providers (TTTA, IFAG, SIE-NL, SIE-BE),
- industry (CAF, MAPTM, IDI, RC, VALEO),

- social science (TUE) and
- stakeholder associations (IRU, FIA).

To ensure the value of the project results are maximised, the symbiosis of research, technology and business will enable AIthena to demonstrate direct relevance to European society and industry.

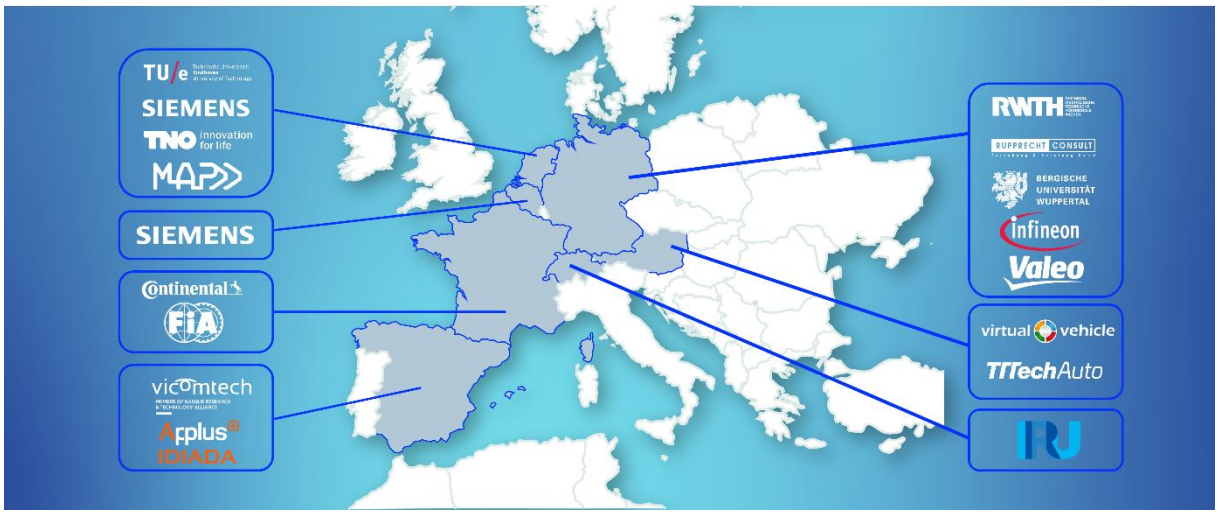

Figure 1: Distribution of AIthena partners

1.3. Purpose of this deliverable

This deliverable *(D6.5 Report on Dissemination and Standardisation Activities*) presents the dissemination and standardisation activities carried out in Tasks T6.2 Scientific and industrial dissemination and standardisation [M6-M36] and T6.3 End user dissemination [M13-M36].

This deliverable provides details of the activities carried out by the AIthena consortium partners in the period from M6 to M36 of the AIthena project's lifetime. These activities were carried out as part of the following two tasks in the ***Work Package 6 – IMPACT: Exploitation, Dissemination and Standardisation [M1-M36]***:

- Task 6.2 *Scientific and industrial dissemination and standardisation [M3-M36]* which connected the AIthena project's results and achievements with relevant scientific and industrial forums, as events and expert audiences, and disseminated the tools and knowledge generated by the project.
- Task 6.3 *End user dissemination [M13-M36]* focused on the preparation and implementation of an information campaign aimed at educating users about the use cases developed in the project, as well as promoting the advantages that XAI can bring to users in CCAM.

1.4. Structure of this deliverable

The AIthena document, *D6.5 Report on Dissemination and Standardisation Activities,* is organised to provide a comprehensive overview of the dissemination and standardisation activities carried out within the project. It begins with an introduction to the AIthena concept, objectives, and consortium. The report then outlines the purpose and intended audience of the deliverable.

The main body is structured around the activities of Work Package 6, detailing the work plan, responsibilities, and specific tasks:

- Task 6.2: Scientific and industrial dissemination and standardisation, including engagement with scientific and industrial communities, publication of papers, and organisation of practitioners' workshops.
- Task 6.3: End user dissemination, focusing on information campaigns, public events, and online outreach to educate users about project use cases and the benefits of explainable AI in CCAM.

The deliverable describes the interactions between WP6 and the other work packages, the collaboration with other EU-funded projects and the clustering activities.

Finally, it provides a summary of scientific and technical publications, a glossary of terms and acronyms, and a list of references.

2. Work Package 6 - work plan and responsibilities

Task No	Task Title	Task Leader	Task Duration
6.1	Communication strategy	FIA	M1-M5[36][1]
6.2	Scientific and industrial dissemination and standardisation	VALEO	M6-M36
6.3	End user dissemination	FIA	M13-M36
6.4	OpenData plan and OpenTool plan and sharing	VICOM	M17-M36
6.5	Lessons learned and policy recommendations	RC	M22-M36
6.6	Exploitation & commercialisation plan	IRU	M18-M36

Table 1: List of Tasks in Work Package 6

The focus of Work Package 6 (WP6) was to have an impact in terms of communication, dissemination, and exploitation, including standardisation. The AIthena project objectives, goals and role of all AIthena project consortium partners were communicated, its achievements were disseminated, and its results will be exploited in accordance with the standardisation plan.

2.1. Task 6.2 Scientific and industrial dissemination and standardisation

The task aimed to connect with relevant scientific and industrial fora and events to disseminate the tools and knowledge generated in the project to an expert audience. The work commenced with the identification of requirements and barriers for industry deployment of the developed solutions, setting the priorities for the content output.
Regarding the exchange with the scientific community, Task 6.2 focused on making the project output accessible through the publication of scientific papers and presentations at relevant conferences. Additionally, a series of yearly practitioners' workshops were organised to facilitate an in-depth exchange on the AIthena developments, tools, and methods.

2.2. Task 6.3 End user dissemination

The core of Task 6.3 was an information campaign aimed at educating users about the use cases developed in the project and promoting the advantages of XAI in CCAM to the users. To provide relevant information, the content of the campaign was aligned with the user groups and user needs defined in *Task 1.4 Identification of user group needs and definition of use cases*, as well as with the Use Cases work and development in *WP5 DEPLOY & TEST: AI-based CCAM Deployment – integration on operation and end user validation.*

[1] Task 6.1 *Communication strategy* coordinates the work in WP6 and monitors WP6 related activities in all WPs. It was therefore agreed to extend the timetable for T6.1 as M1-M36.

The campaign utilised a two-pronged approach: the task joined public events to disseminate the developed information via printed materials and presentations, allowing users to gather first-hand insights into AI processes in a CCAM vehicle. Additionally, an online campaign reached users via social media. The campaign was implemented on the AIthena website and social media channels (LinkedIn and X), with all AIthena consortium partners requested to support the campaign's activity.

2.3. Interactions between WP6 and other WPs in AIthena project

WP6 ensured that all work packages in the AIthena project were aligned in terms of communication, dissemination and exploitation activities, including standardisation.

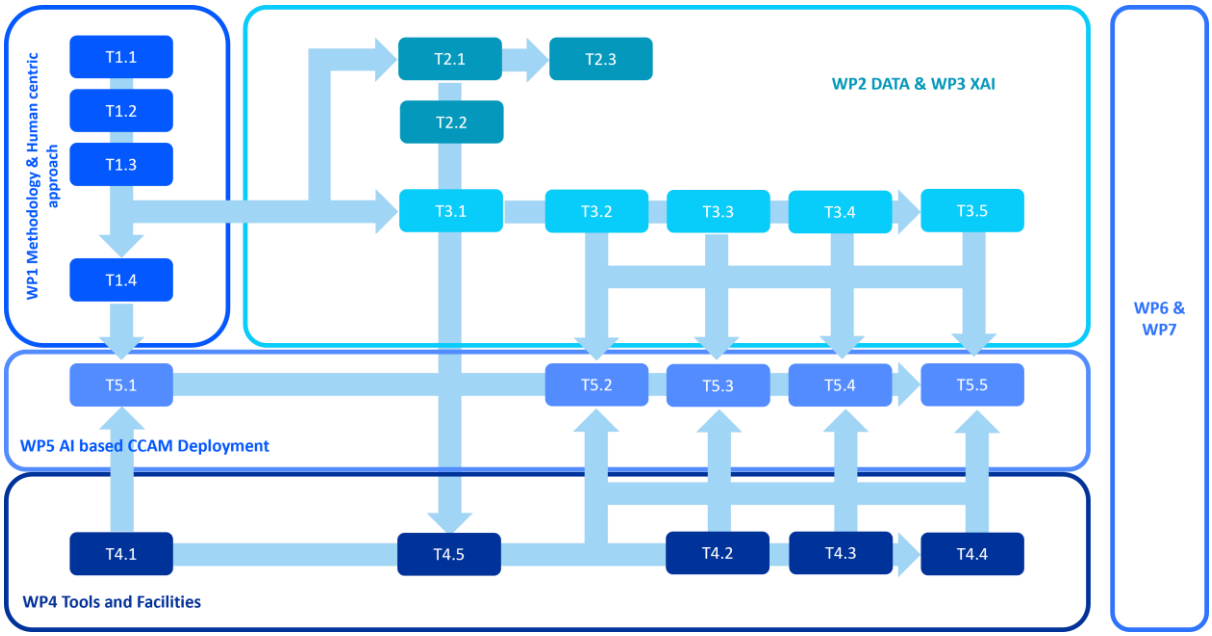

Figure 2: Inter-relation between WPs

2.4. Intended audience of this deliverable

Similarly to D6.1 Initial Communication, Dissemination and Standardisation Plan [M6] and D6.6 Updated Communication, Dissemination and Standardisation Plan [M18], this deliverable is a public report which will be made available on the AIthena website[2] and in the AIthena Zenodo account[3] after approval by the European Commission and CINEA[4]. This document summarises the activities implemented within Tasks 6.2 and 6.3 for the AIthena consortium partners. For audiences external to the consortium, it provides an overview of AIthena project activities relating to dissemination and standardisation.

[2] https://aithena.eu/library/
[3] https://zenodo.org/communities/aithena/about
[4] https://cinea.ec.europa.eu/index_en

3. Scientific and industrial dissemination and standardisation

3.1. Scientific and industrial dissemination activities

A central pillar of the AIthena dissemination strategy was to engage actively with the scientific community, establishing the project's credibility and sharing its evolving insights. We achieved this by making a variety of contributions at important international conferences and workshops, including formal papers and poster presentations. This chapter summarises the external presence of various events (the list is not exhaustive).

AIthena partners engaged in a wide range of impactful dissemination activities. These include presenting papers and posters at leading international conferences, delivering speeches and keynotes at major industry events, and organising or participating in technical workshops and policy-focused sessions. The AIthena project also maintained visibility through exhibitions and demonstrations at European events, and actively fostered collaboration and knowledge exchange via networking and matchmaking sessions with other EU project partners.

International conferences

AIthena partners have actively contributed to major international conferences by presenting their research and engaging with global experts.

- IEEE Intelligent Vehicles Symposium (IV): IKA presented papers and posters on advanced topics such as LiDAR-camera fusion and privacy protection in autonomous vehicles (Jeju Island, Korea, 2024).
- IEEE International Conference on Intelligent Transportation Systems (ITSC): VICOM and IKA delivered papers and organised special sessions focused on the verification and validation of autonomous driving functions (Bilbao, Spain, 2023; Edmonton, Canada, 2024).
- International Congress on Transportation Research (ICTR): IRU presented work on AI and explainable AI in road transport (Thessaloniki, Greece, 2025).
- International Conference on Computer Vision (ICCV): BUW showcased its research into computer vision for autonomous vehicles (Honolulu, Hawaii, USA, 2025).

European conferences and events

AIthena partners maintained a strong and visible presence at key European events.

- EUCAD (European Conference on Connected and Automated Driving): VICOM and FIA represented the project at exhibitions, networking events and demonstrations in Brussels (2023), Dublin (2024) and Ispra (2025).
- ITS European Congress: VICOM presented papers and participated in sessions on smart mobility and intelligent transport systems (Lisbon, 2023; Seville, 2025).
- TRA (Transport Research Arena, Dublin, 2024): VICOM represented AIthena, showcasing and contributing to several activities: an open-access paper, a poster, a demonstration and a video at the European Commission stand.
- RTR Conference (Road Transport Research): VICOM presented AIthena in session focused on CCAM enablers (Brussels, 2025).

Figure 3: AIthena at the TRA 2024

Workshops and special sessions

AIthena partners were also involved in specialised workshops and sessions.

- CVPR Workshop (Safe Artificial Intelligence for All Domains): VALEO presented research on machine learning and computer vision for safe AI (Seattle, USA, 2024).
- ROSCon: IKA presented open-source code releases and V2X communication datasets in ROS (Karlsruhe, Germany, 2023; Odense, Denmark, 2024).
- Driving Simulation Conference Europe: SIE-NL and VICOM presented papers and participated in simulation and virtual reality sessions (Antibes, France, 2023).

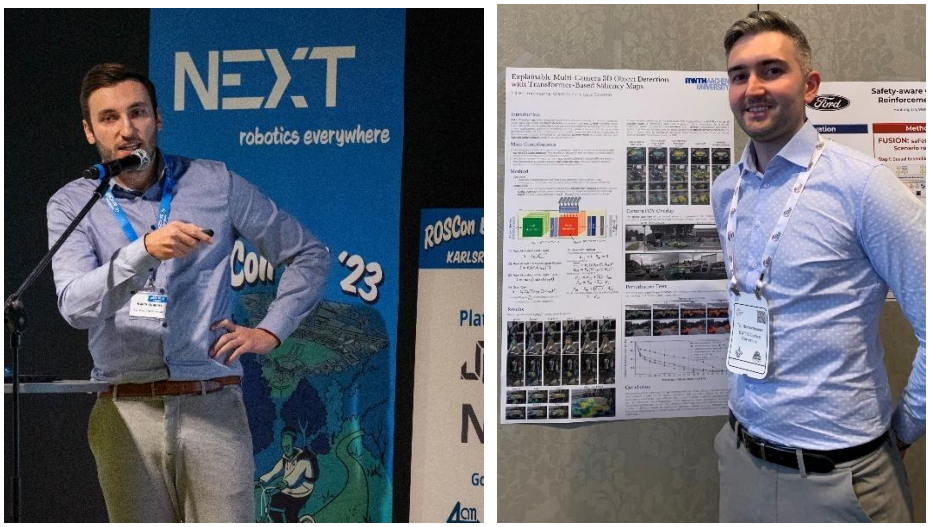

Figure 4: AIthena at the ROSCon 2023 and ML4AD 2023 conferences

AIthena at the EUCAD conferences

Since 2023, AIthena has maintained a consistent and visible presence at EUCAD conferences, engaging with a wide range of stakeholders in connected and automated driving. In 2023, at the Brussels conference, AIthena was represented by VICOM and FIA, who had a stand at the networking event and participated in the CCAM projects' exhibition. In 2024 (Dublin), VICOM presented projects at the poster exhibition and networking session. For the 2025 conference in Ispra, VICOM showcased static outdoor demonstrations and hosted an informative stand. These activities, ranging from exhibitions and poster sessions to demonstrations, highlight AIthena's

commitment to networking, knowledge exchange and engaging with industry, research and policymakers within the European CCAM community.

Figure 5: AIthena at the EUCAD 2023 in Brussels

AIthena at the ITS European Congresses

AIthena has established a strong scientific presence at the ITS European Congresses, with VICOM regularly presenting peer-reviewed papers. In 2023 (Lisbon), the AIthena project introduced its work on trustworthy, explainable, and accountable AI for connected and automated mobility. In 2025 (Seville), VICOM presented research on generative AI for privacy protection in autonomous vehicles. These activities have reached an international audience of experts, researchers, and industry stakeholders in smart mobility and intelligent transport systems, highlighting AIthena's ongoing contributions to trustworthy AI, explainable AI, and privacy-preserving technologies in autonomous vehicles.

AIthena at the RTR Conference

At the 2025 Road Transport Research Conference (RTR) in Brussels, the AIthena project was represented by its coordinator, Oihana Otaegui (Vicomtech), who presented it in the 'CCAM Enablers' session. This major event for EU-funded road transport projects presented valuable opportunities for AIthena to engage with the scientific and policy communities, as well as to network with researchers, policymakers and industry representatives from the Horizon 2020 and Horizon Europe programmes. AIthena's participation in the RTR conference underscored its dedication to showcasing enabling technologies for Cooperative, Connected, and Automated Mobility (CCAM), while also maintaining its visibility among pivotal stakeholders in the realm of European road transport research.

Figure 6: AIthena at the RTR Conference 2025

To further highlight the project activities, here are some more examples of the Athena consortium's widespread contributions, with key partners leading the dissemination at major international events.

- IKA significantly advanced the project's academic footprint, particularly in the intelligent vehicle domain. Their contributions included: presenting a paper at the 35th IEEE Intelligent Vehicles Symposium (IV 2024) in Korea; publishing the key dataset paper, 'V2AIX: A multi-modal real-world dataset of ETSI ITS V2X messages in public road traffic', at the 27th IEEE International Conference on Intelligent Transportation Systems (September 2024);presenting at the 2025 IEEE International Conference on Robotics and Automation (ICRA) in the USA; and presenting at the VDI Tagung on automated driving in Germany (July 2025).
- MAPTM represented the AIthena consortium at the prestigious TRB Annual Automated Road Transportation Symposium in San Diego (2024), ensuring outreach to North America.

To complement AIthena's scientific publications, the project also maintained a strong physical presence at key industry events through participation in high-visibility exhibitions and demonstration events. This strategy involved creating dedicated project showcases to foster networking and raise awareness.

- At the 2023 Autonomous Main Event, TTTech organised a dedicated 'Spotlight Session' on autonomous driving and future mobility trends. Partners from VIF and IFAG were also involved. This significant platform enabled AIthena to engage directly with influential decision-makers and experts from leading companies. The project's presence was reinforced by a professional roll-up banner and informational leaflets.

Figure 7: AIthena at the Autonomous Main Event in Vienna

At a UNECE meeting in Geneva, where a new legal instrument for automated vehicles was being drafted, the AIthena project contributed to the development of future regulations.

- IRU presented an overview of the AIthena project to an influential audience of international policymakers, legal experts and government representatives, thereby connecting our technical contributions to global regulatory efforts and highlighting its key activities in Automated Driving Systems (ADS).

The multi-faceted dissemination strategy was collectively vital for embedding the project within the wider mobility ecosystem. For the CCAM community, these activities provided valuable insights and shared best practices, contributing directly to the dialogue that shapes future standards and regulations. In terms of the AIthena project itself, this proactive engagement validated our research, increased visibility and established AIthena's reputation as a key contributor. This will ensure that the project's results have a lasting impact.

3.2. Standardisation activities

Standardisation is the process of establishing a structured, universally accepted framework for the development, deployment, and assessment of technologies. Within the context of Artificial Intelligence (AI), it serves as a common ground for defining safety requirements, risk assessment methodologies, and best practices. This creates a consistent and reliable foundation that enables diverse stakeholders—from developers to regulators—to operate from a shared set of principles and technical benchmarks.

For CCAM applications, ensuring safety and trustworthiness is paramount. The core challenge stems from the non-deterministic nature of AI; its inherent unpredictability makes conventional validation and testing methods insufficient. Standardisation is therefore essential to mitigate risks, enhance trust and foster collaboration between academia, industry and regulatory frameworks.

To bridge the gap between research and industry-wide application, AIthena project outlined a strategy to work towards exploiting the results for standardisation. The plan involves a two-fold process:

- Identification: During the project's implementation, specific results and findings that are valuable for standardisation will be identified.
- Incorporation: These identified results will then be channelled into concrete standardisation bodies to ensure the project's achievements have a lasting and widespread impact on the CCAM ecosystem.

Existing standardisation and dissemination efforts were also identified for this purpose that include:

- ISO/PAS 21448 (SOTIF): This standard specifically addresses the safety of the intended functionality, focusing on preventing risks in automated driving systems even when no system failure has occurred.
- ISO/IEC 5338:2023: Defines a comprehensive life cycle for AI systems, from definition and development to management and improvement.
- IEEE CertifAIEd™: A certification program focused on the ethical dimensions of Autonomous Intelligent Systems, including transparency, accountability, and the mitigation of algorithmic bias.
- European Commission Regulation 2022/1426: Establishes rules for the type-approval of automated driving systems in fully automated vehicles.

To aid in the practical application of these standards, Siemens, in collaboration with RDW and JRC, has actively worked to interpret new regulations. A key outcome of this is the dissemination of guidance through the Simcenter website[5] ("Multi-pillar approach for safety validation of automated vehicles"), which serves as a crucial resource for the industry.

AIthena project contributed towards the standardisation efforts in automated mobility by developing a practical framework to embed trustworthiness into the development process.
The project created a comprehensive methodology that translates abstract ethical principles—such as fairness, transparency, accountability, and privacy—into a practical toolkit of checklists and guidelines. The methodology is presented in deliverable, D1.1 (*Methodology for Assessing the Ethics, Transparency, Accountability, and Privacy of AI-Based Systems in CCAM applications*). Crucially, this framework is not just theoretical; it is directly grounded in the systematically gathered needs, expectations, and concerns of diverse stakeholders, including vehicle users, pedestrians, developers, and policymakers. This integration ensures the entire evaluation process is relevant, practical, and truly human-centric.

This work is a significant step forward for the industry as it can provide a repeatable, structured process for ethical AI evaluation that organisations can immediately adopt to improve their systems, it can be used as a precursor to formal standards and could serve as a robust blueprint that can accelerate the creation of official industry standards by bodies like ISO and IEEE.

[5] https://blogs.sw.siemens.com/simcenter/multi-pillar-approach-for-safety-validation-of-automated-vehicles/

To improve transparency and trustworthiness, AIthena introduced a standardised "machine learning model card" specifically for the automated mobility sector. By providing a consistent template for documenting AI models, this work represents a significant step toward industry-wide standardisation. It establishes a common language and a repeatable process for developers, ensuring that critical information is captured.

This user-friendly tool gives developers a structured framework for embedding ethical principles like fairness and accountability throughout the AI lifecycle. Serving as both a developmental guide and a communication tool, the model card helps create more robust and explainable systems while clearly reporting the AI's capabilities and risks—a critical step for building trust in automated vehicle technology.

While a robust framework of standards is emerging, the work is far from complete. Further development and efforts are essential to address the known gaps and challenges that practitioners and standardisation bodies currently face. The path forward involves a concerted effort to develop further regulations and standards to comprehensively address the challenges outlined in section 5.1 in the deliverable D6.6 (*Updated Communication, Dissemination and Standardisation Plan*) ensuring that the future of autonomous driving and CCAM systems is built on a solid foundation of safety, reliability, and trust.

4. End user dissemination

4.1. Information campaign

The AIthena end-user awareness campaign was designed to educate users about the four use cases developed within the AIthena project, as well as to promote the advantages of explainable AI (XAI) within connected and cooperative automated mobility (CCAM). The campaign's content was tailored to the user groups and needs identified in Task 1.4, as well as the four use cases developed in Work Package 5 (WP5).

The campaign adopted the following approach:

- *Public events*: AIthena consortium partners attended public events, conferences, symposia and workshops, disseminating information through publications, presentations and speeches. This allowed a variety of audiences, including end users, to gain first-hand insights into AI processes in a CCAM vehicle.
- *Online campaign*: The online campaign, featuring dedicated messages and visual materials, reached users via social media, particularly on the AIthena website and social media channels (LinkedIn[6] and X[7]). While the online campaign was primarily present on AIthena's social media channels, AIthena consortium partners also supported its activities on their professional and organisational channels.
- *User survey*: A user survey was conducted as part of the WP1 METHODOLOGY. AI Human-centric approach. This addressed people's needs, expectations and concerns relating to all types of road-based passenger vehicles (e.g. buses, taxis, shared vehicles and personal vehicles) that are fully automated and self-driving. The results of the survey were presented in deliverable D1.2 (*User group needs report and technical use case definition*) and were used to craft the messages for the information campaign.

4.2. Campaign materials and implementation

The AIthena user awareness campaign was implemented through a well-structured social media calendar from January to July 2025. The campaign aimed to raise awareness of the AIthena project and its objectives, with a focus on developing trustworthy, explainable and accountable AI-based connected and cooperative automated mobility technologies. Each post highlighted different aspects of the AIthena project, including its four main use cases.

The campaign utilised AIthena's social media channels on LinkedIn and X (formerly Twitter). Each week, a post was published to highlight different aspects of the project, such as its research objectives, use cases, and the importance of explainable AI in CCAM. The posts were designed to engage users and provide valuable insights into the project's progress and objectives.

[6] https://www.linkedin.com/company/aithena-eu-project/

[7] https://twitter.com/_AIthena_

For example, on January 23, 2025, a LinkedIn post introduced the AIthena project and its aim to build trustworthy and explainable CCAM technologies. The post emphasised the importance of robustness, privacy, explainability, accountability, and ethics in AI development.

"The AIthena project aims to build trustworthy, explainable, and accountable Connected and Cooperative Automated Mobility (CCAM) technologies. CCAM solutions are increasingly present in vehicle technologies, which benefit from AI. But AI can be unfair, biased, and can be extremely sensitive to unexpected inputs.
Building explainable and trustworthy AI is the next mandatory step of technology development, incorporating among other equally important properties: robustness, privacy, explainability, accountability, and ethics.

Learn more about the project here https://aithena.eu/

#AIthenaProject #CCAM #AI #Mobility

[Visual: Visual 1 – Facts.png]

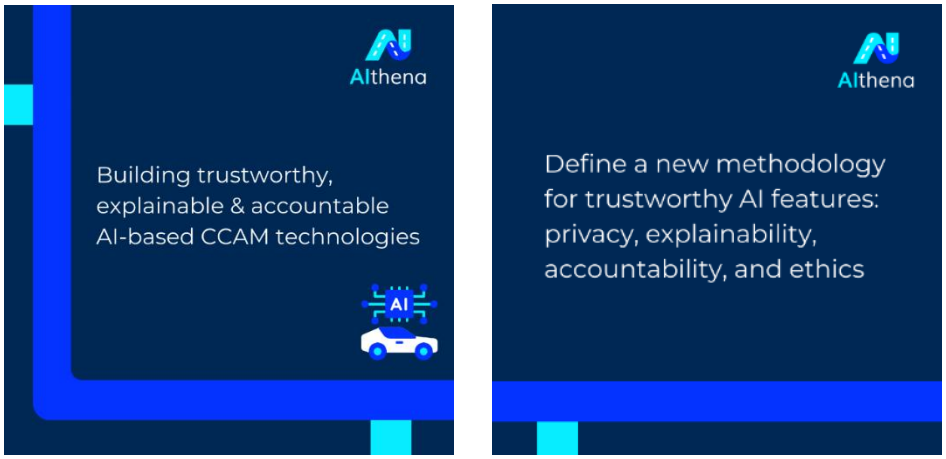

Figure 8: Examples of the campaign visuals

Another example, on April 3, 2025, a LinkedIn post introduced the Use Case 1 which focuses on Trustworthy Perception Systems for CCAM. This use case involves using AI to assist built-in sensors in vehicles to detect objects. The goal is to develop safety-critical applications of perception systems, enhancing the ability of vehicles to perceive their surroundings accurately and reliably.

"There are four use cases in the AIthena project.
Use case 1 tackles perception systems and components in vehicles with the assistance of AI. Through built-in sensors in a vehicle, objects can be detected. Research partners contribute to developing safety-critical applications of perception systems.
Watch the video below or read more about Use Case 1 here: https://aithena.eu/aithena-use-case-1-trustworthy-perception-systems-for-ccam/
#AIthenaProject #CCAM #AI #Mobility
[Visual: Use case 1 – short video]

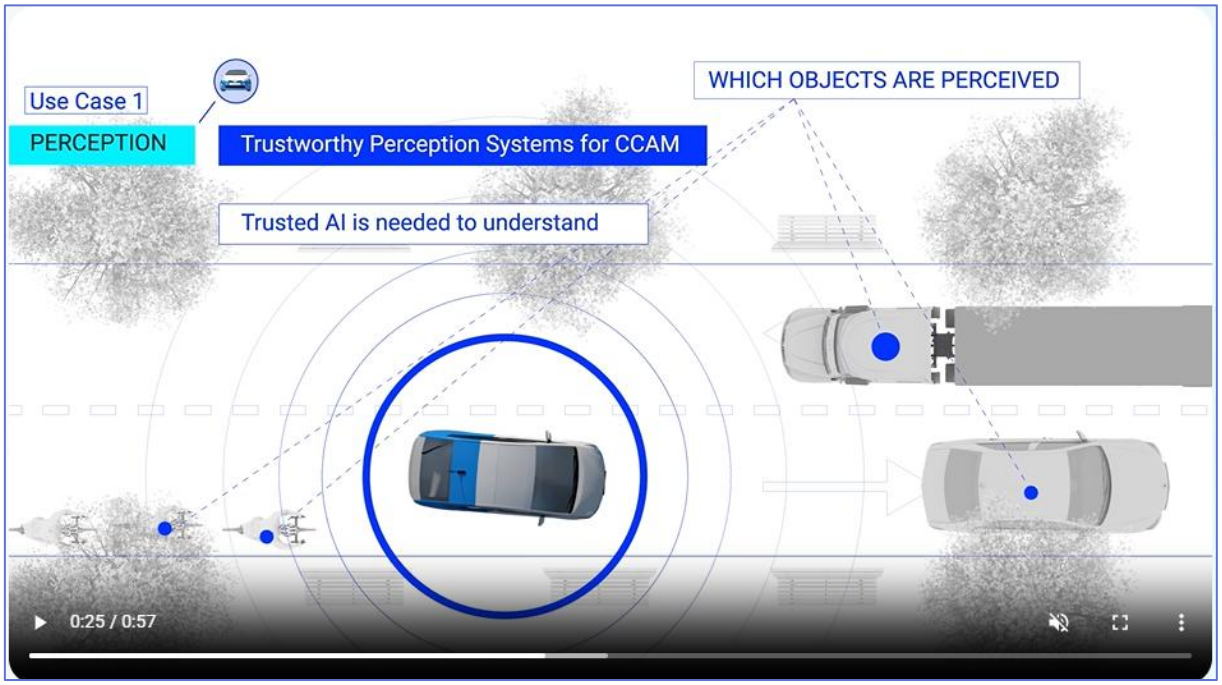

Figure 9: Screenshot of the UC1 video

The posts were accompanied by relevant visuals and links to more detailed information on the AIthena website. The campaign used hashtags like #AIthenaProject, #CCAM, #AI, and #Mobility to increase visibility and engagement on social media. The campaign also included visuals to enhance engagement, such as infographics and images related to the project's objectives and use cases. These visuals were shared across both LinkedIn and X to reach a broader audience.

Figure 10: Campaign visuals - AIthena project objectives

Additionally, short videos[8] presenting four use cases were used in the campaign to support the online audience's understanding of project activities. In the initial stage of campaign implementation, news articles on the AIthena website and newsletters featured details of AIthena use cases.

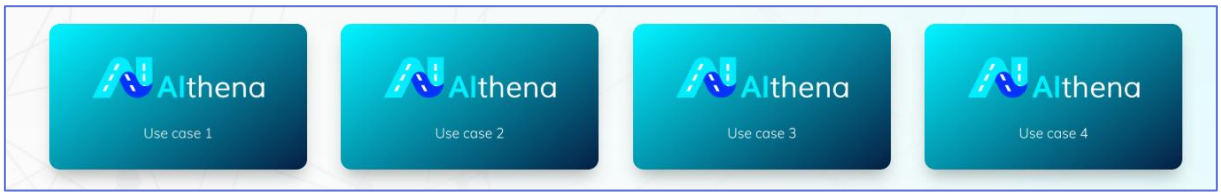

Figure 11: Campaign videos - four use cases

In addition, a series of news items describing public deliverables and reports (following EC approval) enriched the online campaign's goal of educating users about the various use cases developed within the project.

Overall, the AIthena user awareness campaign effectively utilised the AIthena project social media channels to disseminate information about the project, its use cases, engage users, and promote the benefits of explainable AI in CCAM.

[8] https://aithena.eu/use-cases-introduction/

5. Yearly practitioners' workshops

A series of annual workshops for practitioners were organised to enable an in-depth exchange of views with stakeholders external to the project consortium partners on the tools and methods developed in the AIthena project. Three workshops were organised by the AIthena partners, each focusing on a different aspect. A summary of these workshops is provided below.

5.1. 1st Practitioners' Workshop

The 1st Practitioners' Workshop was organised on 16 November 2023, in conjunction with the AIthena consortium meeting (15-16 November 2023) in Eindhoven, the Netherlands. It was hosted by the Eindhoven University of Technology. The workshop consisted of two sessions.

Session 1

The first session of the workshop dealt with the results of the survey that was administered to gather valuable insights into user perspectives, needs, and expectations in the realm of Artificial Intelligence (AI) and Cooperative, Connected, and Automated Mobility (CCAM).

The session aimed to leverage insights from external speakers, foster discussions on user needs and challenges, and facilitate breakout sessions for refining the AIthena use cases.

External speakers

Two distinguished external speakers, Matina Loukea from CERTH – Drive2theFuture[9] project, and Dr. Konstantinos Gkiotsalitis from the National Technical University of Athens from CONDUCTOR[10], shared their expertise and insights with the AIthena project team.

Presentations and discussions

The presentations focused on user needs, challenges, and expectations in the context of AI and CCAM. The discussions following the presentations provided a valuable opportunity for the project team to gain diverse perspectives and insights, enriching the ongoing research on user perspectives and acceptance.

Breakout sessions

Following the presentations and discussions, the workshop transitioned into breakout sessions. Three groups were formed, each dedicated to a specific use case: Use Case 1, Use Case 2, and Use Cases 3 and 4. The goal was to harness the survey results and insights from the external speakers to refine and shape the identified use cases. In these sessions, team members actively engaged in collaborative discussions, exploring how the survey findings could be effectively utilised to enhance the relevance and applicability of each use case. The breakout sessions offered an opportunity for in-depth analysis and strategic planning, encouraging collaboration among team members.

[9] https://www.drive2thefuture.eu/
[10] https://conductor-project.eu/

Key outcomes

- Diverse perspectives: The insights from both external speakers broadened the perspective of the AIthena team, offering diverse viewpoints on user needs and challenges in the context of AI and CCAM.
- Collaborative refinement: The breakout sessions facilitated collaborative refinement of the use cases, ensuring that the survey results were translated into actionable strategies for the development and implementation of AIthena.
- Enhanced research approach: The workshop's outcomes contribute significantly to the ongoing research, refining the focus areas based on real-world user expectations and challenges.

Session 2

In this session, the key concepts of Data and Model Cards and their use in the AITHENA project were discussed.

Data and Model Cards

Data and Model Cards are reports that provide important information about a dataset or a Machine Learning (ML) model that we have trained. These were first introduced by Google, who suggested that for AI to be more user-focused, we need to inform users, developers, and auditors about the specific information in a dataset, how a model was trained, what results can be expected, and where improvements can be made. These documents contribute to explainability, transparency, governance and, in general, to the trustworthiness of ML models.

Data Cards includes information about a dataset, such as who published it or who funded the process. It also includes details about the data, like what is recorded, the date, and importantly, some data statistics that can help us see if every class is well represented. For example, if the data doesn't include many cyclists, a model trained with this data might not recognize them well. The Data Card also needs to mention any sensitive data that was recorded, whether intentionally or accidentally, and explain how we handle such data.

Continuing with Model Cards, like a Data Card, they include details about, for example, the model's development, performance, limitations, risks, and purpose. The evaluation included in the model card must have metrics of the model against different demographic groups to assess the model's fairness and to identify any potential biases, if the model's purpose affects humans. For example, if a facial recognition model performs well on light-skinned individuals but poorly on dark-skinned individuals, this would be clearly indicated in the Model Card. This allows users, developers, and auditors to understand the model's limitations and potential areas for improvement.

AIthena Model and Data Cards

For AITHENA, we have proposed specific versions of Model and Data Cards. These are designed to serve the same purpose as those proposed by Google, but with a focus on the CCAM (Cooperative, Connected, and Automated Mobility) field of application. Hard and digital copies of this documents were distributed to the attendees of the workshop to gather feedback about the

usefulness, comprehensiveness, understandability, and the representativeness of the sections included in these documents.

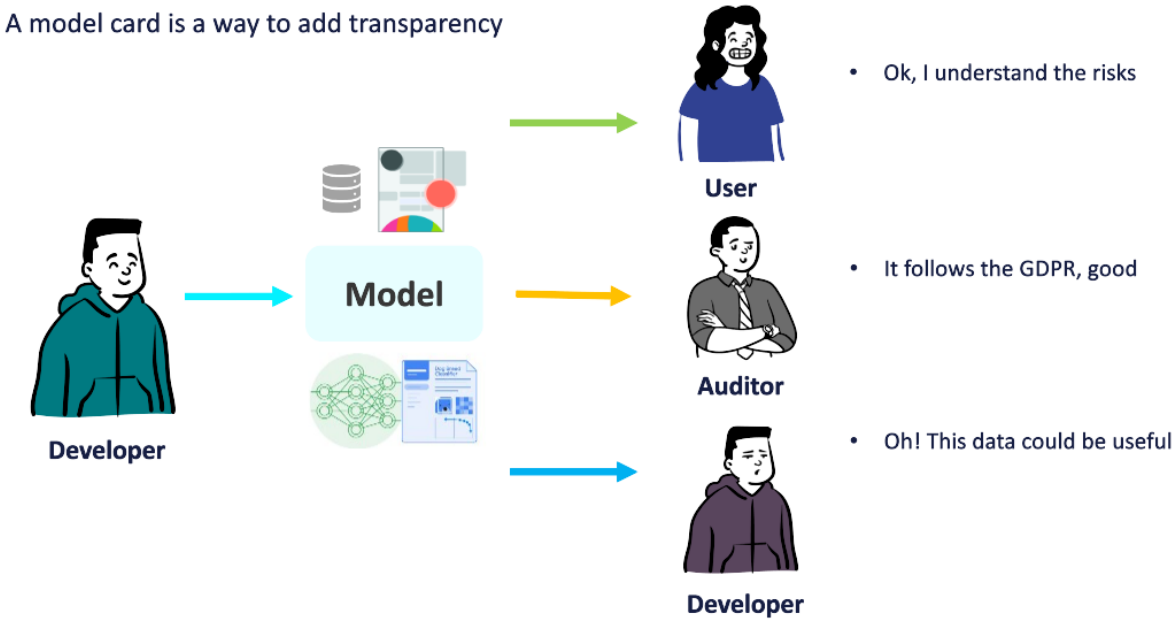

Figure 12: A model card

5.2. 2nd Practitioners' Workshop

The 2nd Practitioner's Workshop of the AIthena project was held online on 26 February 2025. In the introductory part of the workshop, the AIthena project which focuses on building trustworthy, explainable and accountable CCAM technologies was introduced. The value proposition of the project, emphasising its potential impact and the key challenges that may be encountered during its realisation were outlined. A brief overview of the project's approach and objectives was also provided, laying the groundwork for the following discussions and presentations.

Participants
The online workshop was attended by seventeen participants including nine external attendees.

Presentations
Two presentations were given during the workshop, each covering the main aspects of the project.

- Building a Trustworthy AI Methodology in AIthena

The first presentation focused on a trustworthy AI methodology developed as a tool in AIthena to build trustworthy AI applications in CCAM applications. This tool can serve as a checklist to enable different users like developers, regulators, authorities, testers or end users to evaluate the ethical, transparency, accountability and privacy-preserving aspects of AI applications in CCAM. The structure of the tool and how to evaluate the AI applications with respect to four trustworthiness related topics, fairness, transparency, accountability, and privacy were presented.

- Data Anonymisation Pipelines and GDPR Compliance

In the second presentation, the importance and motivation for anonymisation of recorded data and being GDPR compliant was outlined. The presentation highlighted key challenges and the importance of data anonymisation at the source without loss of important information. A comparison between different anonymisation methods and the advantage of using GenAI to mitigate the suboptimal results observed in other methods like blurring was explained.

Interactive sessions
Following the presentations, the workshop featured an interactive session where the topic for discussion was 'Addressing Real-World Challenges with the AIthena Approach'. Mentimeter[11] tool was used to post questions related to the real-world challenges in CCAM applications and how they can be prioritised. Participants provided their responses on the main challenges that they see are important while implementing the before mentioned methodology. A poll was also conducted to prioritise the main challenges wherein the 'Availability of Experts' received a highest of 6 votes and 'Understanding Regulatory Framework' 4 votes.

In the second part of this session, practical demonstrations of the AIthena use-cases were presented. The first use case that was presented was 'Trustworthy Perception systems for CCAM - Reliable Pedestrian Detection in Urban Environments', focusing mainly on the pipeline and its implementation. Key challenges like discrepancies between data or detections from different sensors were also highlighted. Additionally, the use of data and model cards to evaluate fairness and other trustworthy AI aspects was discussed.

The second use case that was presented was 'Trustworthy and Human understandable Decision Making – Explainable and robust decision making', which highlights the importance of decision making for planning and manoeuvring in autonomous driving. How ML decision-making and human understandable definitions of traffic rules encoded in the HD maps can be combined to make the system more robust and explainable to maximize safety and comfort. The concept was also illustrated with different traffic scenarios and examples. At the end, the AIthena methodology checklist was also applied to the two use-cases presented here to evaluate the AI trustworthiness aspects namely fairness, transparency, accountability and privacy.

In conclusion, the upcoming AIthena activities were mentioned where different stakeholders can collaborate for CCAM related topics and projects.

5.3. 3rd Practitioners' Workshop

The 3rd AIthena Practitioner Workshop was held in a hybrid format during the EUCAD 2025 conference[12] at the Joint Research Centre (JRC) in Ispra on 15 May 2025. Centred around the question "How can AI revolutionise road transport?", the session brought together experts and stakeholders to explore the transformative role of artificial intelligence in the mobility sector. The workshop addressed both the opportunities and challenges of deploying AI in road transport and

[11] https://www.mentimeter.com/
[12] https://www.connectedautomateddriving.eu/eucad/eucad2025/

sought to define concrete strategies for integrating human-centric, trustworthy AI into connected, cooperative and automated mobility (CCAM) systems.

Participants

The workshop attracted a diverse and multidisciplinary audience, both in-person and online, including representatives from academia, industry, public authorities and regulatory institutions. Participants shared a common commitment to advancing safe, ethical and effective AI solutions in the rapidly evolving domain of CCAM.

Presentations

The session opened with a comprehensive presentation of the AIthena project's objectives and scope, focusing on the development of trustworthy, explainable and accountable AI systems tailored for CCAM applications. The speakers highlighted AIthena's interdisciplinary framework, which integrates:

- Advanced perception technologies, enabling robust environmental understanding for autonomous systems.
- Ethical AI governance models, ensuring alignment with fundamental rights, societal values and EU regulations.
- Simulation-based validation tools, providing virtual environments to rigorously test AI performance in safety-critical scenarios.

A significant part of the presentations was devoted to real-world use cases demonstrating the applicability of AIthena technologies across multiple domains:

- Freight and logistics: showcased how AI-driven algorithms improve route optimisation, real-time fleet coordination and predictive cargo management, leading to enhanced operational efficiency and reduced environmental impact.
- Passenger mobility services: AI-enabled perception systems for detecting and responding to complex traffic situations, as well as decision-making algorithms that prioritise safety and comfort in autonomous vehicles.
- Urban mobility ecosystems: examples included the use of AI for real-time traffic signal control, multimodal transport planning and dynamic public transport coordination, all designed with a user-centric and inclusive approach.

Throughout the presentations, a recurring theme was the embedding of core ethical principles, such as transparency, privacy-by-design and societal acceptability, into every stage of the AI lifecycle.

Interactive breakout sessions

During the workshop two interactive breakout sessions were held, which enabled participants to engage in peer-to-peer dialogue and collaborative problem-solving.

Key discussion areas included:

- Pathways for AI adoption in road transport, tracing the journey from early-stage R&D to real-world deployment. Participants debated the necessary policy incentives, pilot projects and public-private partnerships to scale up AI solutions effectively.
- Barriers to implementation, such as fragmented regulatory landscapes, insufficient interoperability between AI systems and gaps in workforce skills. Actionable

measures were proposed, such as including harmonised standards, cross-border testbeds and targeted training programmes.

- Simulation and validation methodologies, with a spotlight on AIthena's virtual testing platforms. Discussions explored how these environments can support scenario-based safety assessments, improve explainability and build public trust in AI-powered mobility.

The sessions allowed participants to exchange practical insights, reflect on lessons from ongoing deployments and identify priority areas for future research and innovation.

Conclusion

The workshop concluded by reaffirming the strategic importance of cross-sector collaboration in driving AI innovation that aligns with Europe's vision for sustainable, inclusive and safe mobility systems. Participants were encouraged to stay engaged with AIthena's research and demonstration activities and to contribute to the growing community shaping the future of responsible AI in transport. The event highlighted AIthena's central role as both a technology enabler and policy facilitator, reinforcing its contribution to making AI not only smarter, but also more accountable, transparent and trustworthy, a critical foundation for public acceptance and large-scale deployment of CCAM solutions across Europe.

Figure 13: AIthena 3rd Practitioners Workshop

6. Clustering with other EU-funded projects

6.1. Collaboration with other projects

From the outset of the AIthena project's implementation, the consortium partners were encouraged to identify further collaboration opportunities with relevant EU-funded projects and European and international initiatives. These efforts resulted in the AIthena consortium collaborating and clustering with other relevant existing and closed EU-funded projects, creating synergies and implementing joint activities.
AIthena consortium partners have actively collaborated with other EU-funded projects, both ongoing and completed, to create synergies, share knowledge and maximise research impact.

Key collaborative efforts established during the lifespan of the AIthena project include:

- Hi-Drive[13]: We explored collaboration regarding the anonymisation techniques developed by AIthena (removing identifiable information) that minimise the impact on subsequent data usage (training and validation).
- AWARD[14]: Knowledge transfer on automated vehicle logistics use cases, including participation in workshops and the final event.
- FAME[15]: Collaboration on the European Common Evaluation Methodology (EU-CEM), the CCAM taxonomy and data sharing best practices, as well as participation in the CCAM test data space.
- Drive2theFuture[16], CONDUCTOR[17] and ArchitectECA2023[18]: Collaboration with partners to share lessons learned.
- CONNECT[19]: Active participation in a workshop and presentation of the AIthena methodology, as well as contribution to a joint publication.
- AI4CCAM[20]: Close engagement through online meetings and an extensive exchange, as well as shared event participation.

[13] https://www.hi-drive.eu/
[14] https://award-h2020.eu/
[15] https://www.connectedautomateddriving.eu/about/fame/
[16] https://www.drive2thefuture.eu/
[17] https://conductor-project.eu/
[18] https://architect-eca2030.eu/
[19] https://horizon-connect.eu/
[20] https://www.ai4ccam.eu/

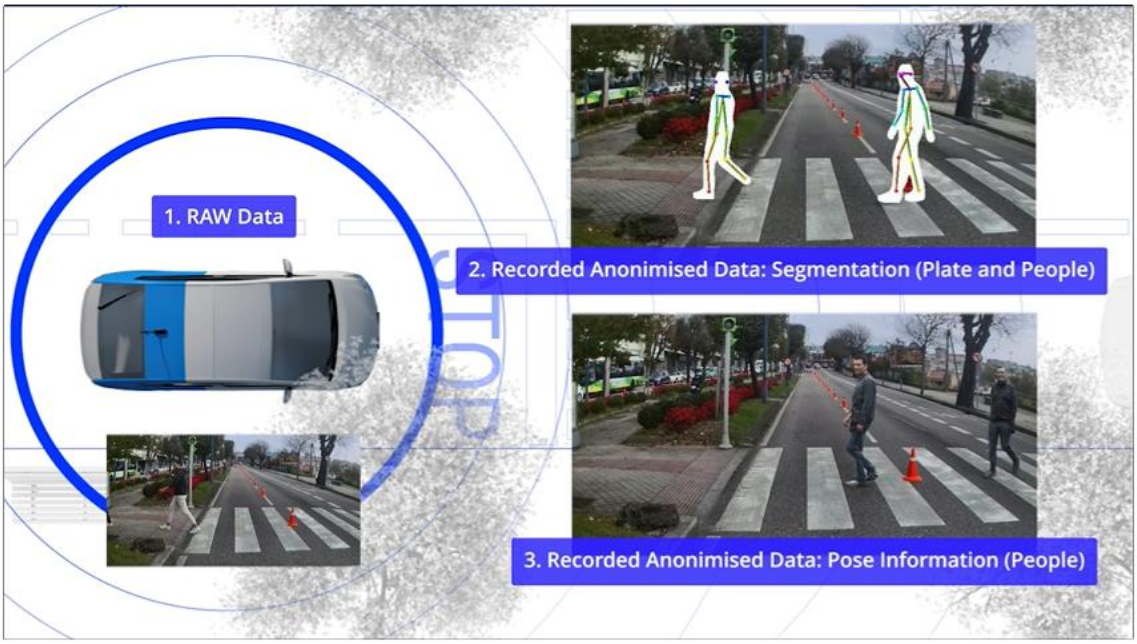

Figure 14: AIthena Data Anonymisation Pipeline

Figure 15: AIthena at the AWARD2020 final event

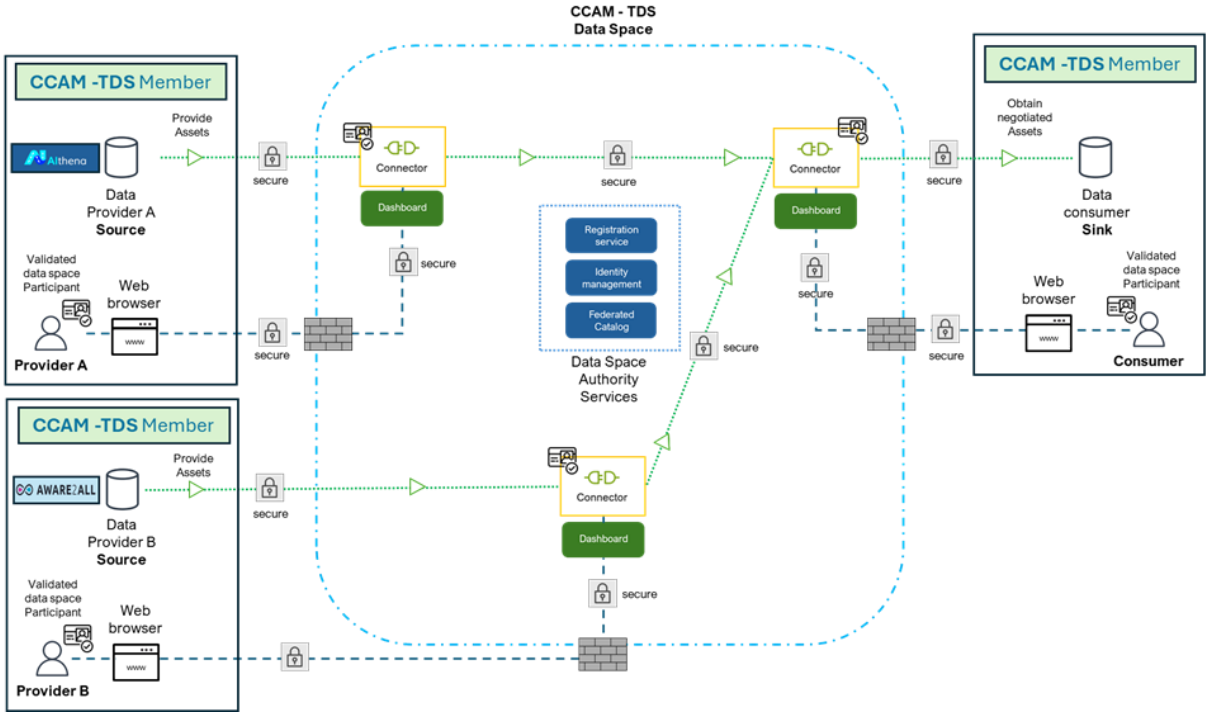

Figure 16: FAME CCAM Test Data Space

Figure 17: AIthena at the CONNECT AI workshop

Furthermore, AIthena joined the *Integrated CCAM Technologies Cluster*[21] . This cluster brings together six leading EU projects focused on connected, cooperative, and automated mobility (CCAM): AITHENA, CONDUCTOR, EVENTS, FRODDO, iEXODDUS and PoDIUM.

The cluster aims to:

- Accelerate innovation by combining expertise in AI, sensing, cybersecurity and automation.

[21] https://aithena.eu/launch-of-the-integrated-ccam-technologies-cluster/

- Enhance the interoperability of CCAM technologies.
- Maximise impact through joint activities and coordinated dissemination.

Figure 18: AIthena at the iCCAM Technologies Cluster meeting in Ispra

Drawing on their experience of collaborating with other EU-funded CCAM projects, the AIthena project partners emphasise the importance of collaboration and learning, which can be summarised as follows:

- Knowledge sharing: by collaborating with other relevant EU-funded projects and initiatives, AIthena was able to build on existing results, avoid duplication and learn from real-world challenges.
- Cross-project synergies: joining the Integrated CCAM Technologies Cluster fosters interdisciplinary cooperation, leading to more robust, scalable and interoperable solutions.
- Accelerated innovation: tapping into the collective expertise of multiple EU-funded projects enables AIthena to advance CCAM technologies faster and more efficiently.
- Impact maximisation: shared dissemination efforts (e.g. joint events and publications) ensure that research outcomes reach a wider audience and carry more weight in terms of policy and industry relevance.
- Future-readiness: lessons learned from completed and ongoing projects help AIthena to align its methodologies with emerging standards, ensuring sustainability and relevance beyond the project's lifecycle.

The AIthena project's collaboration with other EU-funded initiatives has been instrumental in enabling innovation, learning and a broader impact. It demonstrates how cooperation at the EU level can increase the effectiveness of research projects, speed up the adoption of technology, and encourage a unified European approach to future mobility.

7. Scientific and technical publications

7.1. Open access scientific and technical publications

The AIthena consortium partners are committed to delivering high-quality, pre-reviewed, open-access papers. As of the end of October 2025, 20 scientific and technical papers had been produced as part of the AIthena project. All these papers underwent peer review and were published as conference papers, proceedings, white papers, and journal articles.

The AIthena Library[22] is home to an ever-expanding collection of scientific and technical papers that showcase the project's dedication to promoting trustworthy, transparent, and accountable AI for Connected, Cooperative, and Automated Mobility (CCAM). These publications cover a variety of subjects, including AI lifecycle governance, model transparency, safety assurance, synthetic data generation and human-centric design.
Each paper contributes to the four foundational pillars of AIthena: ethics, transparency, accountability and privacy. The research is grounded in real-world use cases and developed in collaboration with leading experts from academia, industry and policy. AIthena publications provide valuable insights into the methodologies, tools, and frameworks shaping the future of AI in mobility for researchers, developers, policymakers, and stakeholders in the CCAM ecosystem.

Conference papers and proceedings:

- "An Evaluation of Time-triggered Scheduling in the Linux Kernel"
- "Digital twin for synthetic data generation – application for automated driving systems"
- "Runtime Safety Assurance of Autonomous Vehicles"
- "Explainable Multi-Camera 3D Object Detection with Transformer-Based Saliency Maps"
- "AITHENA: towards a trustworthy AI for CCAM development"
- "MultiCorrupt: A Multi-Modal Robustness Dataset and Benchmark of LiDAR-Camera Fusion for 3D Object Detection"
- "V2AIX: A Multi-Modal Real-World Dataset of ETSI ITS V2X Messages in Public Road Traffic"
- "A Multimodal Sensor Setup for In Situ Comparison of Driving Dynamics, Physiological Responses and Passenger Comfort in Autonomous Vehicles"
- "OCCUQ: Exploring Efficient Uncertainty Quantification for 3D Occupancy Prediction"
- "Generative AI for Privacy Protection of Images in Autonomous Vehicles"
- "Identifikation des Einflusses verschiedener Umfeldbedingungen auf das Fahrverhalten unter Verwendung von Verhaltensdaten" (engl. "Identifying the influence of different environmental conditions on driving behavior using behavioral data")
- "Rethinking Backbone Design for Lightweight 3D Object Detection in LiDAR"
- "What Did I Learn? Operational Competence Assessment for AI-based Trajectory Planners"

[22] https://aithena.eu/library/

Journals:

- "WebLabel: OpenLABEL-compliant multi-sensor labelling"
- “Trustworthiness Assurance Assessment for High-Risk AI-Based Systems”
- "Toward Explainability in Urban Motion Prediction—Survey and Outlook"
- "A Methodology to Enhance Transparency for Trustworthy Artificial Intelligence for Cooperative, Connected, and Automated Mobility"
- "Explainable Safety Argumentation for the Deployment of Automated Vehicles"
- "Exploring the potential of standardized behavior competencies in automated driving systems"

White paper:

- DIGITAL INDUSTRIES SOFTWARE "Supporting automated driving systems development with synthetic data"

For full list of AIthena publications please visit the AIthena Library[23] on the website and the AIthena Zenodo[24] account.

[23] https://aithena.eu/library/
[24] https://zenodo.org/communities/aithena/about

8. Althena Final Event

8.1. Summary of the final event

On 2 October 2025, the AIthena Project showcased its three-year journey with a Final Event in Brussels, marking the culmination of its work in advancing Connected, Cooperative, and Automated Mobility (CCAM) through Artificial Intelligence (AI).
Hosted at Comet Louise, the event brought together researchers, industry professionals, policymakers and leaders to showcase AIthena's achievements, explore the latest innovations and discuss the role of AI in CCAM.

Opening remarks and keynote
The event began with a welcome address by Dr. Oihana Otaegui, the project coordinator from Vicomtech. She reflected on the consortium's collaborative efforts and the importance of trust in AI for mobility systems.
This was followed by a keynote address from Suzanna Kraak (DG RTD) representing the European Commission. The speech emphasised the Commission's ambition to restore the EU's leadership in autonomous systems and digital innovation. The strategic value of projects such as AIthena was emphasised, as was their role in advancing Europe's digital transition and sustainable mobility goals: "We are making significant progress in making AI trustworthy".

Technical sessions and use cases
A series of technical presentations showcased AIthena's research and its real-world applications.

- **Methodology overview**

Daniel Franco (Rupprecht Consult) gave a detailed presentation on the project's multi-layered, human-centric methodology for ensuring the trustworthiness of AI in CCAM environments. His presentation focused on the key principles of the AIthena methodology, such as fairness, transparency, and accountability. AIthena's methodology ensures the development of trustworthy, ethical, and human-centric AI for automated mobility, operationalising fairness, transparency, accountability, and privacy through practical checklists, guidelines, and tools. The methodology supports continuous improvement, stakeholder guidance, and compliance with regulations such as the EU AI Act and GDPR, thereby bridging the gap between technical development and societal expectations.

- **Use Case 1: Trustworthy Perception Systems for CCAM**

Till Beemelmanns (ika – RWTH Aachen University) demonstrated advancements in perception systems that can reliably detect and interpret environmental data. He highlighted a growing trend in AI development, noting that although components have become larger and more complex, they have also become less transparent and more difficult to interpret. The AIthena project's Use Case 1 has developed a trustworthy perception system for connected and cooperative automated mobility, with a focus on reliable pedestrian detection in urban environments. The system uses multi-modal sensor fusion (radar, camera and LiDAR), explainable AI layers and visualisation interfaces to enhance robustness, transparency and user understanding. The approach

emphasises documentation, regulatory compliance and open-source benchmarking in order to support safer automated driving and to build public trust in AI-driven mobility solutions.

- **Use Case 2.1: Collision prediction with Hybrid AI data fusion models**

In a joint presentation, Jos den Ouden and Svetlana Orlova from Eindhoven University of Technology (TU/e) and Rubén Naranjo de las Heras from Vicomtech presented novel data fusion models designed to improve collision prediction in complex traffic scenarios. The presentation also emphasised the importance of adopting a more data-driven approach. Use Case 2.1 aimed to enhance the prediction of collision risk in automated driving by combining multiple AI models and data sources, particularly in complex or edge-case scenarios where traditional methods are ineffective. The approach uses ontology-based scene understanding and video foundation models to interpret road scenes, assess risk and detect anomalies. This results in improved data quality, explainability and reliability in rare or challenging situations. This hybrid approach enables automated vehicles to make safer, more transparent, and more robust decisions in real-world traffic.

- **Use Case 2.2: Robust prediction modules for Robo-taxis in urban environments**

In his presentation, Bernhard Hillbrand (Virtual Vehicle) explored how AI could ensure the safety and reliability of self-driving city taxis. Use Case 2.2 has focused on developing robust AI modules that can predict the movement of road users, enabling robo-taxis to operate safely and reliably in complex urban scenarios. This approach leverages real-world sensor data, automated annotation and deep learning to enhance situational awareness and ensure high accuracy and adaptability, even in challenging conditions. This approach facilitates the integration of scalable systems, ensures regulatory compliance and enhances the safety of automated mobility systems.

- **Use Case 3: Trustworthy and human-understandable decision-making**

Guido Linden (ika – RWTH Aachen University) addressed the crucial challenge of interpretability in AI, emphasising the importance of ensuring that AI-driven decisions are transparent and consistent with human reasoning. One promising approach to achieving this is to combine prediction and planning. Use Case 3 has focused on developing explainable and robust decision-making systems for automated vehicles, so users can understand and trust AI-based decisions. The approach combines deep learning-based behaviour planning with rule-based tactical planning and visualises decisions for occupants. It also measures system competence in real time to trigger safer strategies when needed. This approach promotes regulatory compliance and public trust by ensuring transparency, providing documentation and enabling deployment in real-world and simulated environments.

- **Use Case 4: AI-based traffic management**

Anton Wijbenga (MAPtm) presented a methodology using a simulation framework that road operators and transport authorities can apply to assess the impact of introducing automated vehicles on the network in terms of efficiency, sustainability, and safety. Evaluating the results of different simulation parameters and scenarios in relation to their effects on network KPIs improves the transparency of how the AI in automated vehicles influences the traffic network. Use Case 4 analysed and optimised the impact of automated vehicles (AVs) on traffic networks by

applying AI-based traffic management strategies that prioritise efficiency, safety and sustainability. Microsimulation tools were used to model network-level effects, evaluate AV behaviours under different market penetration scenarios, and track key performance indicators such as capacity, safety, and emissions. This approach provides policymakers with actionable insights and highlights the importance of cooperative AV behaviours and trust in traffic management systems for maximising benefits.

Throughout the morning and at lunchtime, attendees visited the exhibition rooms, where use cases were demonstrated.

Panel discussion

The presentations were followed by a panel discussion featuring Silvia Barbaro, Hamza Guirrou, Ted Zotos (International Road Transport Union, IRU) and Nathalie Poissonnier (Federatie van de Belgische Autobus- en Autocarondernemers en Reisorganisatoren, FBAA). The discussion focused on regulatory frameworks, deployment challenges and the strategic potential of integrating trustworthy AI into mobility systems.

Nathalie Poissonnier pointed out that some opportunities are still “under the radar”, particularly with regard to reducing drivers' workload: "More development is needed in planning, particularly driver planning, which takes up a lot of their time. But we also need to help predict the best routes to take," she added, stressing that AI can play an important role in reducing traffic jams and improving efficiency.

Hamza Guirrou stressed the importance of building trust in the role of AI in mobility, stating: “We need to work on accepting that AI can support the driver and make his life easier without taking his place.”

Closing remarks

Pedro Alfonso Pérez Losa, representing the European Climate, Infrastructure and Environment Executive Agency (CINEA), delivered a summary and congratulated the AIthena project on its strong alignment with EU strategic priorities. 'The basis is to introduce safety and security in autonomous mobility, making trustworthy AI a key element in CCAM'. He highlighted significant progress, including extensive collaboration with other countries that are actively investing in this area.

The event concluded with a speech by Dr. Oihana Otaegui, who asked the audience for feedback and celebrated the community built through AIthena’s work. This was followed by a networking lunch, which provided an opportunity for participants to connect with each other, discuss potential future collaborations, and share insights.

Figure 19: AIthena Final Event in Brussels

9. Summary

Deliverable D6.5 provides a comprehensive account of the dissemination and standardisation activities undertaken by the AIthena consortium. This is a multi-partner EU project focused on advancing trustworthy and explainable artificial intelligence (AI) for Connected, Cooperative and Automated Mobility (CCAM). The report covers the period from project month 6 to month 36, detailing efforts to engage with the scientific, industrial and end-user communities, and to contribute to the development of AI mobility standards and best practices.

AIthena's core mission is to develop frameworks and methodologies for explainable and trustworthy AI in CCAM. This involves addressing key challenges such as explainability, privacy, ethics and accountability. The consortium comprises 17 partners from six EU countries and Switzerland, representing the fields of research, technology, industry, the social sciences, and stakeholder associations. This diverse partnership ensures a holistic approach to technical innovation and societal impact.

The project's dissemination strategy was multifaceted:

Scientific and industrial dissemination: Athena partners presented their research at major international conferences such as the ITS European Congress, IEEE IV, CVPR, EUCAD, TRA and RTR Conferences. They also published over 20 peer-reviewed open-access papers and participated in high-visibility industry events and exhibitions. Annual practitioners' workshops enabled in-depth exchanges with external stakeholders, fostering feedback and collaboration.

End user dissemination: A targeted information campaign was implemented through public events and a structured social media calendar on platforms: LinkedIn and X (formerly Twitter). Videos, infographics and news articles were used to raise awareness of explainable AI in CCAM. Tailored to user groups, the campaign highlighted the project's four main use cases, emphasising the societal benefits of trustworthy AI.

Standardisation activities: AIthena partners have actively contributed to the standardisation landscape by:
- identifying project results with potential for standardisation and channelling them into the relevant bodies (e.g. ISO, IEEE and UNECE).
- developing practical frameworks and tools, such as model and data cards, to operationalise ethical principles (e.g. fairness, transparency, accountability and privacy) in AI development.
- supporting the interpretation and application of new regulations and providing guidance for industry adoption.

Workshops and collaboration: Three annual workshops for practitioners were organised, each focusing on a different aspect of trustworthy AI, such as user needs, ethical evaluation tools and real-world use cases. These workshops facilitated knowledge exchange, collaborative problem solving and the refinement of project outputs. AIthena also collaborated with other EU-funded

projects (e.g. Hi-Drive, AWARD, FAME and AI4CCAM) to maximise research impact and foster innovation through joint activities and shared dissemination.

Scientific output: By October 2025, AIthena partners had produced a substantial collection of scientific and technical publications. These covered topics such as AI lifecycle governance, model transparency, safety assurance, synthetic data generation and human-centric design. These publications are available via the AIthena Library and Zenodo account, supporting ongoing research and policy development within the CCAM ecosystem.

Final event and impact: The project concluded with a high-profile event in Brussels featuring technical presentations and demonstrations of use cases, as well as a panel discussion on regulatory and deployment challenges. The event showcased AIthena's accomplishments and its pivotal role in shaping the future of trustworthy AI in the mobility sector.

Future outlook: AIthena's work establishes a robust basis for the ongoing development and implementation of explainable and reliable AI in CCAM. The project's methodologies, tools and collaborative networks are expected to influence future standards, regulatory frameworks and industry practices. However, ongoing challenges include addressing gaps in standardisation, ensuring interoperability, and fostering public trust. By emphasising cross-sector collaboration, ethical governance and open dissemination, the consortium is positioning AIthena as a key enabler for the responsible adoption of AI in European mobility and beyond.

10. List of acronyms and terms

Acronym	Definition
AI	Artificial Intelligence
AIS	Autonomous Intelligent Systems
ADS	Automated Driving System
CCAM	Connected, Cooperative and Automotive Mobility
CINEA	European Climate, Infrastructure and Environment Executive Agency
DX.X	Deliverable
EC	European Commission
EU	European Union
ETSI	European Telecommunications Standards Institute
GA	Grant Agreement
GDPR	General Data Protection Regulation
HE	Horizon Europe
H2020	Horizon 2020
ISO	International Organization for Standardization
JRC	Joint Research Centre
KPI	Key Performance Indicators
MLOps	Machine Learning Operations
MX.X	Milestone
OEMs	Original Equipment Manufacturers
SERI	Swiss State Secretariat for Education, Research, and Innovation
TX.X	Task
RIA	Research and Innovation Actions
RDW	The Netherlands Vehicle Authority
WPX	Work Package
XAI	Explainable Artificial Intelligence

11. References

Paraskevas Karachatzis, Jan Ruh, Silviu S. Craciunas: “An Evaluation of Time-triggered Scheduling in the Linux Kernel”, https://www.cs.uni-salzburg.at/~scraciunas/pdf/conferences/karachatzis_rtns23.pdf

Hassan Hotait, Alexandru Forrai: “Digital twin for synthetic data generation – application for automated driving systems”, https://zenodo.org/records/12723883

Alexandru Forrai, V. Neelgundmath, K.K. Unni, I. Barosan: “Runtime Safety Assurance of Autonomous Vehicles”, https://zenodo.org/records/12724018

Till Beemelmanns, Wassim Zahr, Lutz Eckstein: “Explainable Multi-Camera 3D Object Detection with Transformer-Based Saliency Maps”, https://arxiv.org/abs/2312.14606

Oihana Otaegui, Marcos Nieto, Sinziana Ioana Rasca, Jos den Ouden, Carles Ubach, Michael Stolz, Justyna Beckmann: "AITHENA: towards a trustworthy AI for CCAM development", https://zenodo.org/records/16085152

Till Beemelmanns, Quan Zhang, Christian Geller, Lutz Eckstein: "MultiCorrupt: A Multi-Modal Robustness Dataset and Benchmark of LiDAR-Camera Fusion for 3D Object Detection", https://arxiv.org/abs/2402.11677

Guido Kueppers, Jean-Pierre Busch, Lennart Reiher, Lutz Eckstein: "V2AIX: A Multi-Modal Real-World Dataset of ETSI ITS V2X Messages in Public Road Traffic" https://arxiv.org/abs/2403.10221

Harald Devriendt, Mathieu Sarrazin, Thomas D'hondt, Konstantinos Gkentsidis, Karl Janssens: "A Multimodal Sensor Setup for In Situ Comparison of Driving Dynamics, Physiological Responses and Passenger Comfort in Autonomous Vehicles", https://openaccess.cms-conferences.org/publications/book/978-1-964867-36-6/article/978-1-964867-36-6_47

Severin Heidrich, Till Beemelmanns, Alexey Nekrasov, Bastian Leibe, Lutz Eckstein: "OCCUQ: Exploring Efficient Uncertainty Quantification for 3D Occupancy Prediction”, https://arxiv.org/abs/2503.10605

Ruben Naranjo, Nerea Aranjuelo, Marcos Nieto, Oihana Otaegui, Itsaso Rodriguez-Moreno: "Generative AI for Privacy Protection of Images in Autonomous Vehicles", https://zenodo.org/records/16087344

Guido Linden (geb. Küppers), Lutz Eckstein: "Identifikation des Einflusses verschiedener Umfeldbedingungen auf das Fahrverhalten unter Verwendung von Verhaltensdaten", https://publications.rwth-aachen.de/record/1015337

Adwait Chandorkar, Hasan Tercan, Tobias Meisen: “Rethinking Backbone Design for Lightweight 3D Object Detection in LiDAR”, https://arxiv.org/abs/2508.00744

Itziar Urbieta, Andoni Mujika, Gonzalo Piérola, Eider Irigoyen, Marcos Nieto, Estibaliz Loyo, Naiara Aginako: “WebLabel: OpenLABEL-compliant multi-sensor labelling", https://link.springer.com/article/10.1007/s11042-023-16664-4

Georg Stettinger, Patrick Weissensteiner, Siddartha Khastgir: “Trustworthiness Assurance Assessment for High-Risk AI-Based Systems”, https://ieeexplore.ieee.org/abstract/document/10430152

Ilma Okanovic, Michael Stolz, Bernhard Hillbrand: "Toward Explainability in Urban Motion Prediction—Survey and Outlook", https://saemobilus.sae.org/articles/toward-explainability-urban-motion-prediction-survey-and-outlook-12-08-01-0009

Paola Natalia Cañas, Marcos Nieto, Oihana Otaegui, Igor Rodriguez: "A Methodology to Enhance Transparency for Trustworthy Artificial Intelligence for Cooperative, Connected, and Automated Mobility", https://saemobilus.sae.org/articles/a-methodology-enhance-transparency-trustworthy-artificial-intelligence-cooperative-connected-automated-mobility-12-08-01-0010

Patrick Weissensteiner, Georg Stettinger: "Explainable Safety Argumentation for the Deployment of Automated Vehicles", https://www.mdpi.com/2079-9292/13/23/4606

Georg Stettinger, Patrick Weissensteiner, Nayel Fabian Salem, Marcus Nolte, Siddartha Khastgir: "Exploring the potential of standardized behavior competencies in automated driving systems", https://www.sciencedirect.com/science/article/pii/S2468601825000264?via%3Dihub

Alexandru Forrai, Hamid Abdolhay: "Supporting automated driving systems development with synthetic data", https://zenodo.org/records/16993081

Michiel Braat, Maren Buermann, Marijke van Weperen, Jan-Pieter Paardekooper: “What Did I Learn? Operational Competence Assessment for AI-based Trajectory Planners”, https://arxiv.org/abs/2510.00619

Bonnie Fenton et al., AIthena D1.1: “Methodology for Assessing the Ethics, Transparency, Accountability, and Privacy of AI-Based Systems in CCAM applications”, https://zenodo.org/records/14329556

Lakshya Pandit et al., AIthena D1.2: “User group needs report and technical use case definition”, https://zenodo.org/records/14328997

Justyna Beckmann et al., AIthena D6.6: “Updated Communication, Dissemination and Standardisation Plan”, https://zenodo.org/records/13375735