Special Session/Workshop I

Challenges & Lessons Learned in CCAM

Abstract (up to 200 words)

The current session, namely *"Challenges & Lessons Learned in CCAM"* will bring together representatives from key European initiatives in Cooperative, Connected and Automated Mobility (CCAM) field to discuss challenges arisen and lessons learned in all interrelated aspects in the field, namely technical, operational, legal and regulatory, standards & policy, data governance, business models, deployment, evaluation and user engagement and other.

The presenters will share the knowledge acquired and will present results, tools, best practices, recommendations, barriers and enablers in selected aspects, as above mentioned, relevant to their work.

An interactive round-table triggering discussion and brainstorming with the audience of the session, in relation to open issues recognised by experts, will close the session.

Aim of the Special Session/Workshop (up to 400 words)

The above topics are deemed of high importance and relevance to the topics of ICTR 2021, as they touch upon one of the most innovative fields in transport, the one of cooperative, connected and automated mobility, that, in turn, touches upon energy and environmental goals as well as sustainability and resilience in transport overall. CCAM is furthermore, by default, a domain where research and industry need to and do already collaborate towards achieving viable but also breakthrough and robust solutions that will penetrate in everyday mobility.

The scope of the session is to showcase the latest advancements in CCAM, with the aim to specifically recognize the key difficulties encountered and substantiate the lessons acquired across all layers to allow the transition to the new era, that one of the real life and wide deployment of the emerging solutions to transform the near future mobility in Europe and beyond.

The specific target of each presentation is shown in the following table.

#	Presentation	Short description
1.	CCAM for Public Transport – Insights from the SPACE project	The Shared Personalised Automated Connected vEhicles (SPACE) project aimed to place public transport at the centre of the automated vehicles revolution and helped build a combined transport ecosystem. The presentation aims to address the following questions: What are the main insights and contribution of the project? What is still needed to make this revolution happen?
2.	User informed CCAM through international surveys	The user perspective has been a missing link for CCAM during the past years. A number of surveys have been conducted recently to address this gap. Yet, such surveys lack cross-national co-ordination and often overlook local

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		socio-economic factors. This presentation will offer an insight to the findings of the WISE-ACT survey distributed in 25 countries, focusing on the influence of e.g. gender about AV sharing.
3.	Towards an automated mobility future: the Drive2theFuture user-centered approach	Presentation on the overview of findings of Drive2theFuture project on the preparation of drivers, travellers and vehicle operators of all modes, towards raising acceptance and willingness to use, in view of the broad deployment of connected, cooperative and automated vehicles. This is approached (among others) through user acceptance surveys, behavioural modelling, development of training programmes and tools, HMI optimization, broad pilot testing, business modelling, policy recommendations and a user acceptance roadmap to automation.
4.	Towards ethical decision support in automated driving systems	Presentation of the models developed for automated decision support in ADS with a focus on the ones referring to ethical aspects and liability.
5.	The acceptance of automated vehicles through understanding the passenger's state	The main goal of H2020 SUaaVE project is to enhance the acceptance of automated vehicles through the formulation of ALFRED, defined as a human centered artificial intelligence to humanize the vehicle actions by understanding the emotions of the passengers and managing corrective actions for enhancing trip experience. This presentation focuses on the approach to estimate the emotional state of the passenger through monitoring their physiological signals and the information from external factors of the vehicle.
6.	A unified network architecture to support advanced CCAM Use Cases.	The main goal of ICT4CART is to design, implement and test in real-life conditions a versatile ICT infrastructure that will enable the transition towards higher levels of automation (up to L4) addressing existing gaps and working with specific key ICT elements. The aim of this architecture is to cover different use cases and to offer the ability for deployment in all test sites and beyond. To achieve this, it has to address the requirements of all the different scenarios while remaining generic enough to be deployed for automated driving in general and to allow more use cases to be integrated. It shows a solution to interoperability of the various heterogeneous networks and software components throughout the architecture. It also defines the high-level data flow in the Communication View and the involved IT services in the Data / IT Environment View. Finally, principles by which cyber-security and privacy will be enforced throughout the architecture are given in the Cyber-Security & Privacy View.

#	Presentation	Short description
7.	Physical and digital infrastructure for CCAM – state of the art	The presentation will discuss the challenges and lessons learned in identifying the ODD related infrastructure attributes and the categorisation of the road and street networks to describe the Infrastructure Support levels for Automated Driving (ISAD). The presentation is based on experiences from European and national projects and platforms studying and discussing these issues.
8.	Forecasting and backcasting of Connected-Automated Vehicle impacts using multiple methodological inputs	The Horizon 2020 Levitate project aims to investigate the potential short, medium and long term impacts of Connected and Automated Transport Systems (CATS), through an innovative multi-disciplinary impact assessment methodology, which will be incorporated within a new web-based policy support tool (PST) to enable city and other authorities to forecast impacts of CATS on urban areas. The proposed presentation will aim to outline the estimation process for the impacts of CATS through a multi-disciplinary impact assessment methodology including microsimulation, system dynamics and the Delphi method, and their subsequent integration into a functional PST.
9.	Safety CCAM introduction - lessons learned from field tests	Presentation of outcomes and lessons learned from field tests carried out in the AV-PL-ROAD project.
10.	Drivers and barriers to automated mobility: lessons learned from an Italian pilot experiment	In this paper the drivers and barriers to automated mobility implementation are investigated, providing also some indications about the assessment of the users' acceptance. The findings come from an experiment conducted on a closed environment in Turin (Italy), test site of SHOW Innovation Action project. The lessons learnt in this study indicate possible challenges and opportunities relevant for the deployment of automated mobility services.
11.	Driving without Driver in Public Transportation	Presentation on the experience from the AVENUE project in the deployment of IT based services targeting in offering the driver assistance services in a driverless PT shuttle, discussing the related issues, obstacles and considerations in the implementation of these services. A novel artificial intelligence (AI) supported framework that enables wide adoption of these services will be also presented envisioning significant enhancement of safety and security levels in automated public transportation as well as passengers trust.
12.	City policy response for adopting innovation in mobility; automated modular buses/pods for cargo hitching (integrated passenger/freight operation) - SPROUT project	Innovative vehicles based on cutting-edge technologies will be deployed and tested within SPROUT to carry both passengers and freight. The cargo hitching concept will be applied to an advanced smart transportation system – called "Next" - based on swarms of (electric) modular self-driving pods. Each module can join and detach with

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		other modules on standard city roads. When joined, a bus-like vehicle is created by modules. The modules can move autonomously on regular roads, join themselves and detach even when in motion. Modules carrying passengers and goods are combined on the basis of estimated flows, which are calculated in real-time by algorithms considering different final destinations by users and freight.
13.	The EU-wide Knowledge base on CCAM: lessons learned from EU-funded and national projects	In an effort to facilitate the exchange of lessons learned and best practices, as well as the identification of synergies and gaps between projects, the EU-funded ARCADE Coordination and Support Action has set up a comprehensive knowledge base on CAD-related activities in Europe and beyond. The project is also gathering best practices and lessons learned from EC funded and national projects. This presentation will provide an overview of the Knowledge base and results from the analysis of lessons learned from projects and pilot activities in Europe.

Organizers

Main Organiser: Dr. Evangelos Bekiaris, Director, Hellenic Institute of Transport (HIT)/ Centre for Research and Technology Hellas (CERTH), Thessaloniki: 6th km. Charilaou- Thermi Rd, 57001 Thermi, Thessaloniki, Macedonia, Greece, Tel. +30-2310-498453; Athens: 52, Egialias, 15125, Marousi, Athens, Greece, Tel. +30-211-1069599, abek@certh.gr, www.hit.certh.gr

Evangelos Bekiaris, PhD on Mechanical Engineering, is the Hellenic Institute of Transport (HIT) Director General as of 2016 and the CERTH Vice-President as of 2021. Since 1992 he has participated in 105 research projects, in 42 of which at the role of Coordinator. He is member of the National Council for Research and Innovation (N.C.R.I.) since 2019, National Representative in the European Commission Climate Neutral and Smart Cities Mission Board of Horizon Europe (HE) since 2020, the National representative of Greece in the H2020 Transport Committee since 2014 and President of the European Conference of Transport Research Institutes (ECTRI) and the European Rail Research Network of Excellence (EURNEX) since 2019. In the past he's also been the President of the European Associations FERSI (on Road Safety) and HUMANIST (on Human Factors in Transport). He is also author of 75 articles in scientific journals, 38 contributions in books, 298 conference publications and editor of 8 books.

Co-organiser: Dr. Maria Gkemou, Principal Researcher, Hellenic Institute of Transport (HIT)/ Centre for Research and Technology Hellas (CERTH), 52, Egialias, 15125, Marousi, Athens, Greece, Tel. +30-211-1069553, mgemou@certh.gr, www.hit.certh.gr

Maria Gkemou is a Principal Researcher at the Hellenic Institute of Transport (HIT) of Centre for Research and Technology Hellas (CERTH) and Head of Clean and Automated Vehicles lab and of Industrial design, Intelligent Materials and Manufacturing in Transport lab at HIT. She is a Mechanical and Aeronautical Engineer with a PhD on driving behaviour modelling. Her main fields of expertise are CCAV, C-ITS, road safety, driving simulation, sustainable and clean mobility, field trials and evaluation in transport field. She works at CERTH/HIT since 2003, she has been/is Technical Manager in three projects, a Sup-project leader in a CCAV H2020 Innovation Action, whilst, in the past, she has participated in more than 15 research projects. She is author of over 60 publications in refereed journals, books and conferences, expert (evaluator/reviewer) in EU funded programmes and reviewer/judge in 4 scientific journals and member of TRA 2022 International Conference Programme Committee.

Co-organiser: Matina Loukea, Research Associate, Hellenic Institute of Transport (HIT)/ Centre for Research and Technology Hellas (CERTH), 52, Egialias, 15125, Marousi, Athens, Greece, Tel. +30-211-1069556, mloukea@certh.gr, www.hit.certh.gr

Matina Loukea is a Psychologist of the University of Athens, with a Master Degree in Science, Technology, Society - Science and Technology Studies and PhD Candidate on Autonomous Road Transport Vehicles in Transition: Governing Transition Pathways and Inclusive Sociotechnical Change. She works as an Associated Researcher in the Hellenic Institute of Transport since 2010 and she is Head of the Laboratory on Touristic Services for Special Groups. Her main fields of expertise are namely: user acceptance and social dimensions of CCAM, training and employability issues in the transportation sector, accessibility in transport and touristic services and pilot trials design. She currently participates in the projects/research studies SHOW (Shared automation Operating models for Worldwide adoption), Drive2TheFuture (Needs, wants and behaviour of "Drivers" and automated vehicles users today and into the future - http://www.drive2thefuture.com, BISON (Biodiversity & Infrastructure Synergies & Opportunities for European Transport Networks) as the Administrative Coordinator, TRA VISIONS 2022 (https://www.travisions.eu), Research Study on the social dimension of the transition to automation and digitalisation in transport, focusing on the labour force. She has also acted as Technical Manager Assistant in the SKILLFUL project (Skills and competences development of future transportation professionals at all levels - http://skillfulproject.eu/) and she has participated in already completed research studies, such as "Best practices guide on the carriage of persons with reduced mobility", "Towards a single and innovative European transport system - Lot 2 - International assessment and action plans of the focus areas", contracted by DG MOVE and "Transport and Tourism for Persons with Disabilities and Persons with Reduced Mobility", contracted by the European Parliament.

Associated project(s)

There are **16 initiatives** active/dealing with CCAV that will be addressed through the presentations, as follows. Their correspondence to the presentations is provided in a section following.

1. **SHOW** H2020 project - https://show-project.eu/

2. **SPACE** H2020 project **-** https://www.uitp.org/projects/space/
3. **Drive2theFuture** H2020 project - http://www.drive2thefuture.eu/
4. **WISE-ACT** project -http://www.wise-act.eu
5. **AVENUE** H2020 project- https://h2020-avenue.eu/
6. **EU EIP** - https://eip.its-platform.eu/
7. **MANTRA** - www.mantra-research.eu
8. **CCAM Platform WG3** Physical and Digital Infrastructure, Classification of road network readiness for highly automated driving in Finland
9. **LEVITATE** H2020 project - levitate-project.eu
10. **Trustonomy** project - https://h2020-trustonomy.eu/
11. **AV-PL-ROAD (national Polish project)** – https://www.its.waw.pl/11124,pl,av_pl_road.html
12. **ARCADE** project **-** https://connectedautomateddriving.eu/about/arcade-project/
13. **SUaaVE** project - http://www.suaave.eu/
14. **ICT4CART** project - https://www.ict4cart.eu/
15. **SPROUT** project - https://sprout-civitas.eu/

Target audience

The target audience of the session is a mixed audience, consisting of research and academia tackling with transport research, development and innovation, industrial partners from the automotive and infrastructure world as well as Tier 1 and 2 suppliers for them, public authorities and decision makers, members of standardization groups and policies contributors/issuers in the field of mobility.

Structure of the workshop

The special session encompasses invited talks and regular presentations from representatives from flagship initiatives in the CCAM area. The session will close with a round-table, where open issues of high interest in the field will be raised by the panelists giving the floor to a fruitful discussion.

The following table presents the proposed structure and timing of the session.

Workshop I - Challenges & Lessons Learned in CCAM (*SHOW project*) **09:00-13:30**	
Room: Muses I **Organizer:** Dr. Evangelos Bekiaris, Director, Hellenic Institute of Transport (HIT)/ Centre for Research and Technology Hellas (CERTH) abek@certh.gr **Co-organizers:** Dr. Maria Gkemou, Principal Researcher, Hellenic Institute of Transport (HIT)/ Centre for Research and Technology Hellas (CERTH) Matina Loukea, Research Associate, Hellenic Institute of Transport (HIT)/ Centre for Research and Technology Hellas (CERTH)	
09:00-09:15	***CCAM for Public Transport – Insights from the SPACE project*** - *Henriette Cornet, UITP*
09:15-09:30	***User informed CCAM through international surveys***

	- *Nikolas Thomopoulos, University of Surrey and WISE-ACT Chair*
09:30-09:45	***Towards an automated mobility future: the Drive2theFuture user-centered approach*** - *Evangelia Gaitanidou, CERTH/HIT*
09:45-10:00	***Towards ethical decision support in automated driving systems*** - *Roi Naveiro, ICMAT*
10:00-10:15	***The acceptance of automated vehicles through understanding the passenger's state*** - *José Solaz, Instituto de Biomecánica de Valencia*
10:15-10:30	***A unified network architecture to support advanced CCAM Use Cases*** - *Vasilis Sourlas, ICCS*
10:30-10:45	***Physical and digital infrastructure for CCAM – state of the art*** - *Risto Kulmala, Traficon*
10:45-11:00	***Forecasting and backcasting of Connected-Automated Vehicle impacts using multiple methodological inputs*** - *Apostolos Ziakopoulos, NTUA*
11:00-11:30	**Coffee Break**
11:30-11:45	***Safety CCAM introduction - lesson learned from fields test*** - *Małgorzata Pędzierska, Motor Transport Institute*
11:45-12:00	***Drivers and barriers to automated mobility: lessons learned from an Italian pilot experiment*** - *Michal Rataj, Links Foundation*
12:00-12:15	***Driving without Driver in Public Transportation*** - *Antonios Lalas, CERTH/ITI*
12:15-12:30	***City policy response for adopting innovation in mobility; automated modular buses/pods for cargo hitching (integrated passenger/freight operation) - SPROUT project*** - *Georgia Ayfantopoulou, CERTH/HIT*
12:30-12:45	***The EU-wide Knowledge base on CCAM: lessons learned from EU-funded and national projects*** - *Stephane Dreher, ERTICO – ITS Europe*
12:45-13:20	***Round – table: «Paving the way forward»*** ***Moderator:*** *Dr. Henriette Cornet, UITP* ***Panel:*** *Dr. Evangelos Bekiaris, CERTH/HIT* *Prof. George Yannis, NTUA* *Dr. Stephane Dreher, ERTICO – ITS Europe* *Dr. Dimitrios Konstantas, UNIGE* *Dr. Angelos Amditis, ICCS* *Nikolas Thomopoulos, University of Surrey* *Prof. Costas Antoniou, Technical University of Munich*
13:20-13:30	***Conclusions***

Invited speakers/regular presentations

The full details of the proposed speakers' affiliations and contact details are provided below.

#	Presentation	Presenter(s) name	Presenter(s) affiliation	Presenter(s) e-mail	Relevant initiative(s)
1.	CCAM for Public Transport – Insights from the SPACE project	Henriette Cornet	UITP	henriette.cornet@uitp.org	**SPACE** H2020 project - https://www.uitp.org/projects/space/
2.	User informed CCAM through international surveys	Nikolas Thomopoulos	University of Surrey	chair@wise-act.eu	**WISE-ACT** project - http://www.wise-act.eu
3.	Towards an automated mobility future: the Drive2theFuture user-centered approach	Evangelia Gaitanidou	CERTH/HIT	lgait@certh.gr	**Drive2theFuture** H2020 project - http://www.drive2thefuture.eu/
4.	Towards ethical decision support in automated driving systems	Roi Naveiro & David Rios Insua	ICMAT	david.rios@icmat.es; roi.naveiro@icmat.es; stefano.bianchi@algowatt.com;	**Trustonomy** project - https://h2020-trustonomy.eu/
5.	The acceptance of automated vehicles through understanding the passenger's state	José Solaz	Instituto de Biomecánica de Valencia	jose.solaz@ibv.org	**SUaaVE** project - http://www.suaave.eu/
6.	A unified network architecture to support advanced CCAM Use Cases.	Vasilis Sourlas	ICCS	v.sourlas@iccs.gr	**ICT4CART** project - https://www.ict4cart.eu/
7.	Physical and digital infrastructure for CCAM – state of the art	Risto Kulmala	Traficon Ltd	risto.kulmala@traficon.fi	**EU EIP** (https://eip.its-platform.eu/), **MANTRA** (www.mantra-research.eu), **CCAM Platform WG3** Physical and

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					Digital Infrastructure, Classification of road network readiness for highly automated driving in Finland
8.	Forecasting and backcasting of Connected-Automated Vehicle impacts using multiple methodological inputs	Apostolos Ziakopoulos	NTUA	apziak@central.ntua.gr	**LEVITATE** H2020 project - levitate-project.eu
9.	Safety CCAM introduction - lesson learned from fields test.	Małgorzata Pędzierska	Motor Transport Institute	malgorzata.pedzierska@its.waw.pl	**AV-PL-ROAD (national Polish project)** – https://www.its.waw.pl/11124,pl,av_pl_road.html
10.	Drivers and barriers to automated mobility: lessons learned from an Italian pilot experiment	Michal Rataj	Links Foundation	michal.rataj@linksfoundation.com	**SHOW** H2020 project - https://show-project.eu/
11.	Driving without Driver in Public Transportation	Antonios Lalas	CERTH/ITI	lalas@iti.gr	**AVENUE** H2020 project- https://h2020-avenue.eu/
12.	City policy response for adopting innovation in mobility; automated modular buses/pods for cargo hitching (integrated passenger/freight operation) -	Georgia Ayfantopoulou; M. Teresa De la Cruz Eiriz	CERTH/HIT/ ZLC	gea@certh.gr; mdelacruz@zlc.edu.es	**SPROUT** project - https://sprout-civitas.eu/

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	SPROUT project				
13.	The EU-wide Knowledge base on CCAM: lessons learned from EU-funded and national projects	Stephane Dreher	ERTICO – ITS Europe	s.dreher@mail.ertico.com	**ARCADE** project - https://connectedautomateddriving.eu/about/arcade-project/