

CONNECTED, COOPERATIVE & AUTOMATED MOBILITY

MULTICLUSTER MEETING 10 OCTOBER 2024

OPENING REMARKS

by Christian Merkt, BMW/CCAM Partnership Chairman & Andrea de Candido, EC DG RTD

FRAMING CONDITIONS OF THE DAY

by Marzena Jougounoux, CCAM Association Head of Office

THE THREE PHASES TO MONITOR THE SRIA PROGRESS



PROJECT OVERVIEW IN CCAM CLUSTERS

Horizon Europe Work Programme

Destination Transport and Smart Mobility services

Calls 2021, 2022 & 2023 Projects

https://www.ccam.eu/projects/



CCAM WORK PROGRAMME 2024

Access here the WP23-24

TOPIC #	CCAM CLUSTER	TOPIC TITLE	TYPE OF ACTION	BUDGET (EUR MILLION)	# OF PROJECTS EXPECTED TO BE FUNDED	# OF SUBMISSIONS
HORIZON-CL5- 2024-D6-01-01	2	Centralised, reliable, cyber-secure & upgradable in-vehicle electronic control architectures for CCAM connected to the cloud-edge continuum	RIA	12	2	12
HORIZON-CL5- 2024-D6-01-02	3	Scenario-based safety assurance of CCAM and related HMI in a dynamically evolving transport system	RIA	14	1	3
HORIZON-CL5- 2024-D6-01-03	4	Orchestration of heterogeneous actors in mixed traffic within the CCAM ecosystem	IA	12	2	7
HORIZON-CL5- 2024-D6-01-04	5	AI for advanced and collective perception and decision making for CCAM applications	RIA	10	2	30
HORIZON-CL5- 2024-D6-01-05	7	Robust Knowledge and Know-How transfer for Key-Deployment Pathways and implementation of the EU-CEM	CSA	4	1	1

The total indicative budget is 52 M€. The call was open from **7 May 2024 and closed on 5 September 2024**.



WORK PROGRAMMES 2025 & 2026-27

WP2025

First draft ready 8 April 2024
Final version: September 2024
Adoption: May 2025 (pre-publication: April)
Open for project submission in 3rd or 4th quarter of 2025

WP2026-27

- First ideas in the process of establishing WP2025
- First headlines and scope at the end of 2024
- Drafting work in 2025 (TBC)



DRAFT CCAM ASSOCIATION PROPOSAL FOR WORK PROGRAMME 2025 AS OF 02/09

Cross-cluster	Advancing remote operations to enable the smart and sustainable mobility of people and goods based on operational and societal needs
Large-scale demonstrations	Preparing for large-scale CCAM demonstrations
Vehicle technologies	Next-generation environment perception for real-world CCAM operations: Error-free and secure technologies to improve energy-efficiency, cost-effectiveness, and circularity
Validation	Integration of human driving behaviour in the validation of CCAM systems
Key enabling technologies	Approaches, verification and training for Edge-AI building blocks for CCAM Systems
Coordination	Federated CCAM data exchange platform



THE BRAINSTORMING ON THE WORK PROGRAMME 2026-27 STARTS NOW



CLUSTER 1 LARGE-SCALE DEMONSTRATIONS IN THE CCAM SRIA



It is expected that the results from Clusters 2-7 will be incorporated into Cluster 1 Large – scale Demonstrations in Pilots, FOTs and Living Labs to support deployment readiness and a final impact assessment.



TO-DATE CCAM DEMO PROJECT BUDGETS

End date

31 March 2026

Hi-Drive

Grant agreement ID: 101006664

DOI 10.3030/101006664

EC signature date 8 December 2020

Start date 1 July 2021

End date 30 June 2025

Funded under

SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

Total cost € 36 973 416,85 EU contribution € 30 000 000,00 Soordinated by VOLKSWAGEN AKTIENGESELLSCHAFT

E Germany

EC signature date 2 September 2022

10.3030/101076810

MODI

DOI

Start date 1 October 2022

Funded under

Climate, Energy and Mobility

Grant agreement ID: 101076810



INTELLIGENTE TRANSPORT SYSTEMER OG TJENESTER - ITS NORWAY

ULTIMO Grant agreement ID: 101077587 DOI 10.3030/101077587 EC signature date 30 August 2022 Start date End date 1 October 2022 30 September 2026 Funded under Climate, Energy and Mobility





Horizon2020

CCAM WORK PROGRAMMES 2025 & 2026-27 & LARGE-SCALE DEMONSTRATIONS CONTENT PROPOSAL

WP2025	WP2026-27: 3 Focus areas:
 Preparing for large-scale CCAM demonstrations (CSA) Pave the road for the forthcoming CCAM deployment and deliver a comprehensive large-scale demonstration plan Ensure the engagement of key stakeholders 	 Demonstrating CCAM for vehicles used in mixed traffic on open-roads/highways and in parking/confined areas Logistics and freight driven People mobility: Public transport driven



NEW CCAM PROJETS' MONITORING STUDY



NEWS

CCAM Association call for tender to monitor quality and impact of funded...

March 28, 2024

>





CCAM Monitoring Project Schedule



AGENDA TODAY

TIME	TOPICS	
10:30-11:10	Breakout-preparatory session	by Hamid Zarghampour, Trafikverket/CCAM Partnership Vice-Chairman
11:10-12:45	Breakouts: What projects' results can be integrated into large-scale demonstrations? What research needs can be postponed till the next Framework Programme?	Clusters 2-6
12:45-13:45	Lunch	
13:45-14:00	Plenary presentation: SINFONICA's Recommendations for large-scale demonstrations	by Prof. Mauro Dell'Amico, ICOOR Italy
14:00-14:15	Plenary presentation: MOVE2CCAM's needs and impact analysis of CCAM stakeholders and citizens	by Héctor Cañas Hernández, BABLE Smart Cities
14:15-14:30	Coffee Break & Transfer	
14:30-16:05	Breakouts: How can defined projects' results be integrated into Cluster 1 and Cluster 7 future calls for projects?	Clusters 1, 6 and 7
16:05-16:15	Transfer break	
16:15-16:30	Closing: Key takeaways	by Christian Merkt , BMW/CCAM Partnership Chairman, Christian Scharnhorst , Bosch/CCAM Partnership Vice-Chairman Andrea de Candido , EC DG RTD
16:30-20:00	Networking & Walking dinner	

BREAKOUT-PREPARATORY SESSION: CCAM 7 CLUSTERS' AND THEIR SRIA PRIORITIES

Moderated by Hamid Zarghampour, Trafikverket/CCAM Partnership Vice-Chairman

COMBINING PAST SUCCESSES WITH FUTURE VISIONS OF CCAM

Leveraging results from previous projects into upcoming LSDemos Take a forwardlooking perspective, discussing key thematic areas and innovation priorities for FP10



WHY LEVERAGING PROJECT RESULTS

Maximizing the value of the past investments

Learning from past projects

Focused integration

How to get the best benefits under budget constrains

Driving societal impact

Not only technical advancement, but creating realworld CCAM solutions

CLUSTER CONTRIBUTIONS FOR LSDEMOS

Cluster 2	Focus on adaptive perception models and sensor fusion for improved vehicle responses, particularly under challenging environmental conditions.
Cluster 3	Results related to validation methods for public road exemptions and scaling challenges, such as cross-border interoperability.
Cluster 4	Large-scale traffic management strategies and Physical Digital Infrastructure (PDI) solutions, demonstrated through living labs.
Cluster 5	AI-driven perception systems and user acceptance studies that are critical for public trust in automated mobility solutions.
Cluster 6	Social equity practices, focusing on affordability and accessibility of CCAM services, particularly for underserved populations.

ONNECTED, COOPERATIVE & AUTOMATED MOBILITY

CLUSTER 2: VEHICLE TECHNOLOGIES

PROJECT	Results with potential for implementation in LSDemos	Lessons learned (both positive and negative)	What is hindering / what still needs to be done?
EVENTS (ICCS)	Collective perception4D bad weather radarVRU prediction	Degradation of sensorsIndependence of costAD system evaluation	Time-consuming approachLack of personnel
ROADVIEW (Högskola i Halmstad)	 Snow removal in LiDAR Slipperiness estimation All-weather navigation 	 AI is vehicle-specific, challenging domain shift Data logging challange 	 Switch to any new sensor requires additional data
AWARE2ALL (Vicomtech)	Occupant MonitoringDriver MonitoringExternal HMI	n/a	n/a
AutoTRUST (CERTH)	Passenger perspectiveData-use optimizationData privacy/security	Representative paxIncentives neededCo-creation commitment	Lack of real-life dataRepresentative dataLong way to AI
OptiPEx (VTT)	Pax behaviour sensingPax experience analysisPax-vehicle interaction	n/a	n/a
	20		

CLUSTER 3: VALIDATION

PROJECT	Results with potential for implementation in LSDemos	Lessons learned	What is hindering / what still needs to be done?
SUNRISE		Coordination Societal Aspect	s and User Needs echnologies
BERTHA	 These projects are primarily to support: Product development processes Type approval schemes Safety rating in consumer testing 		
i4Driving	campaigns (Euro NCAP)	s Jutegratin in the Tran	Safety rating
SYNERGIES	Project just started on 01/06/2024		



CLUSTER 4: INTEGRATING CCAM IN THE TRANSPORT SYSTEM

PROJECT	Results with potential for implementation in LS Demos	Lessons learned (both positive and negative)	What is hindering / what still needs to be done?
Augmented CCAM	Common understanding of requirements and minimum set of infrastructure adaptations for the physical and digital infrastructure.	New PDI Classification & Support Scheme for CCAM, Structuring each PDI in terms of their support to CCAM, prioritisation	New CCAM services deployed in the project test context, 1 new business model, adoption/application of the new service framework by the implementers.
CONDUCTOR	Fleet and traffic management systems for conducting future cooperative mobility: Innovative models and Data Handling solutions.	System validated in three use cases: Integrated traffic management (Athens, Almelo, Madrid), Demand-response transport (Slovenia), Urban logistics (Madrid).	Integrating CCAM in the transport system lies in the integration of highly complex scenarios or that require significant infrastructure changes.
FRODDO	Development and test of a complete suite of methods and tools based on the principles of safe systems design in a federated Digital Twin environment.	Ongoing	Ongoing
IN2CCAM	Concepts for optimal fleet and traffic management, advanced simulations and strategies for traffic optimisation, new lines for cooperation.	Definition of various use cases in six cities. A set of study questions and key performance indicators have been selected for each of the use cases.	Continuation of development of use cases in the Living Labs.
PoDIUM 22	Demos in real-life conditions of specific use cases in three Living Labs in urban, highway & cross-border environments.	Testing, evaluating, and demonstrating CCAM use cases in the Living Labs, supporting the creation of new business models.	PoDIUM's final outcome will be a reference architecture that can be applied to various road environments and infrastructure equipment.

CLUSTER 5 KEY ENABLING TECHNOLOGIES

PROJECT	Results with potential for implementation in LSDemos	Lessons learned	What is hindering / what still needs to be done?
CONNECT	Trust Assessment Framework, DT, information exchange	TRUST	KI KZ
SELFY	Situational awareness and collective perception, resilience tooling, Trust data management	TRUST, high need for real- world validation scenarios	Validation scenarios with growing complexity, standardization to facilitate interoperability
AITHENA	Methodology for Trustworthy Al management (design, development, validation) Trustworthy Al modules (perception, decision making)	What's the scalability of trustworthy AI in real-world applications? (Data and AI model requirements and specifications)	TRL steps needed Policy, standards etc
AI4CCAM	Trustworthy AI incl ethics, qualitative scene understanding	Fairness, diversity, inclusivity	Scaling up of ethics & scenarios library
SYNERGIES	(tools for) scenarios (extraction, generation, management)	Data ≠ just data ≠ info Difficulty Edge cases and representativity	

CLUSTER 6: SOCIETAL ASPECTS & PEOPLE NEEDS

TO BE DISCUSSED TODAY!

Lessons learned (both positive and negative)	What is hindering / what still needs to be done?
	Lessons learned (both positive and negative)

CCAM MEMBERS

MOVE2CCAM

SINFONICA

DIVERSIFY CCAM

CULTURALROAD

CCAM-ERAS

Recommendations for large-scale demo projects involving MaaS, to include user & societal aspects, location-specific characteristics of the implementation area

From SRIA:

Input for Partnership's evaluation of the largescale demonstrators & public engagement activities for realistic expectations

CLUSTER 7: COORDINATION



Tools for LSDemos	What still needs to be done?
 Taxonomy Tool for common terminology, definitions and data description for projects 	Use it! Needs validation & contribution from all CCAM projects. Can be expanded if deemed desirable
 EU Common Evaluation Methodology Builds on 10 years of experience in CCAM evaluation and lessons learned Draft EU-CEM Handbook available* (May 2024) Final EU-CEM by July 2025 	Finalising the handbook based on feedback from 30+ external experts & summer school participants from 20+ CCAM projects
 EU Framework for Testing Legal & administrative procedures for testing on public roads analysed for 30 countries Proposal for a harmonised EU framework for testing on public road planned for early 2025 	 Implementation of the testing framework by Member States. Unlimited series homologation. Harmonization of national deployment regulation in EU
 CCAM Test Data Space Federated Data Space for projects to share test data in secure & trusted way 	Needs participation, validation & adoption by CCAM projects

* https://www.connectedautomateddriving.eu/wp-content/uploads/2024/05/EU-CEM-Handbook_DRAFT_240502.pdf

INTEGRATING PAST RESULTS AND SHAPING **FUTURE RESEARCH**

From Past to Present: Already - a strong foundation of research, but how to leverage these results for the coming project (LSDemo projects)

From Present to Future: Lessons from past projects helps to identifying critical research areas that reflect both societal needs and technological challenges.

Strategic Alignment:

Maintaining a consistent focus on both short-term impact through LSDemo and long-term success through well-targeted research themes under FP10 26

MOVING FORWARD WITH BREAKOUT SESSION

Outcome:

Results from each breakout will be documented. It includes among others, the identified challenges and opportunities

Expectations:

Participate actively and think not just about your individual projects but how your results can contribute to a coherent, large-scale solution



BREAKOUTS

TIME	BREAKOUTS: What projects' results can be integrated into large-scale demonstrations? What research needs can be postponed till the next Framework Programme?
11:10-12:45	 Switch between the groups after 45 minutes. Possible to attend 2 groups. Cluster 2 Vehicle technologies (Hertz) Cluster 3 Validation (Galilei) Cluster 4 Integrating CCAM in the transport system (Baekeland -1) Cluster 5 Key enabling technologies (Darwin) Cluster 6 Societal aspects and people needs (Edison)
12:45-13:45	Lunch
13:45-14:00	Plenary

SINFONICA'S RECOMMENDATIONS FOR LARGE-SCALE DEMONSTRATIONS

by Prof. Mauro Dell'Amico, ICOOR Italy





Funded by the European Union

10/10/2024

SINFONICA Meets the CCAM Association

Prof. Mauro Dell'Amico ICOOR



SINFONICA at a Glance

- SINFONICA: Social INnovation to FOster iNclusive cooperative, Connected and Automated Mobility
- Call identifier: HORIZON-CL5-2021-D6-01
- > **Topic:** HORIZON-CL5-2021-D6-01-05 (Area B)
- ➤ Time frame: 6/2022 5/2025
- Partners: 13 + 1 (7 countries)
- ➤ Budget: 3 759 723,75 €
- SINFONICA Goal: to develop functional, efficient, and innovative strategies, methods and tools to engage CCAM users, providers and other stakeholders to collect, understand and structure in a manageable and exploitable way their needs, desires, and concerns related to CCAM.





Methodology



Participatory Approaches



European Workshop



DRAFT

Recommendations for largescale demonstration projects





Your pilot should serve as a prelude to a wider roll-out of CCAM, generating results to support broader deployment beyond the technical scope \rightarrow Imagine <u>a plan after the pilot and discuss it with citizens and users</u>!



Demonstrations often run without fares to attract users: consideration should be given to ticketing and payment for full-scale operations \rightarrow Use the pilot to discuss the economic topic with the users and the municipality!



Hailing, booking, or payment should have a **non-smartphone option** for those without or unwilling to use such technology \rightarrow Always <u>consider your target</u>!



Users frequently cite slow vehicle speed as an issue in CCAM trials \rightarrow testing different services at higher speeds should be considered. Explain to people why you chose a certain speed and why it is important!





Recommendations for largescale demonstration projects



Integration with other modes, like public transport or multimodal connections, should be prioritized \rightarrow Think <u>outside the box of the CCAM Pilot</u>!



Features should also accommodate people with hearing/sight impairments, those with luggage or children, and people using walking frames \rightarrow Do not consider just «a few» disabilities!



Door operation (whether manual or automatic) should be clear to passengers → Remember the <u>communication</u> is one of the most important aspect!



Vehicles must meet national accessibility standards (wheelchair access, ramps/lifts, handrails...) \rightarrow Involve association of people with mobility challenges to let them feel listened and to be sure they are not left behind!





Recommendations for largescale demonstration projects



The role and necessity of on-board staff should be defined, considering communication needs with remote operators \rightarrow Pick your strategy and communicate it. You can also try different strategies within the same pilot!



Driver presence, training, and role must be specified for vehicles with driving positions, including rules on **attending to passengers while in motion** \rightarrow Once again: <u>communicate</u>!



CCTV should monitor passenger safety and security, with alerts for disruptive behavior \rightarrow Explain what you are doing, why it is useful, how the data will be used...



Evaluate your pilot \rightarrow We have listed a whole KPIs set for the inclusivity to support you with this, and the CCAM Evaluated methodology is very useful as well!





Recommendations for largescale demonstration projects



Frequency or a booking mechanism is essential if standing is not allowed, to prevent passengers from being left behind \rightarrow Organize your pilot to reach your goals and explain why you picked that specific strategy



Accessible information should be available on-board, at bus stops, and online, including video screens for extra assistance. \rightarrow Be aware of impairment and language barriers!



Don't forget the environmental aspect \rightarrow talk about your pilot green impact!



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Funded by the European Union

10/10/2024



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MOVE2CCAM'S NEEDS AND IMPACT ANALYSIS OF CCAM STAKEHOLDERS AND CITIZENS

by Héctor Cañas Hernández, BABLE Smart Cities



MOVE2CCAM

Insights from project's activities

CCAM Partnership MCM 10-10-24 Héctor Cañas



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Learnings from our Demo-Day and VR-Games



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Demo-day at Helmond's CAMPUS









Testing three vehicles:

- Macrostep delivery robot
- Auvetech Iseauto shuttle (cap : 8 seats)
- Karsan Autonomous Bus (cap : 18 seats)

Main objectives :

- Capture feelings after using self-driving vehicles.
- Compare opinions on different self-driving vehicles.
- Assess opinion changes after vehicle usage.
- Compare self-driving with human-driven vehicles.
- Analyze opinions based on participant characteristics.





Demo-day at Helmond's CAMPUS













Shuttle

Delivery Robot





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Virtual Reality Games

3 VR Games sessions in



Gemeente Helmond



- Private autonomous vehicle
- Autonomous Bus

Main objectives:

- Compare perceptions of private vs public self-driving.
- Assess **physiological reactions** via EEG data.
- Capture self-driving vehicles' perceived impacts.
- Analyze reactions across participants and countries.
- Evaluate virtual reality as research method.







Virtual Reality Games





Attribute	Stages								
	1	2	3	4	5	6	7	8	9
Landscape	City centre			Industrial	City centre	Industrial	City centre	Industrial	Residential
Time of day	Daytime			Gradually getting darker				Night-time	
Congestion	No		Ge	ts progressively worse				Eases up	No

Attribute	Stages								
	1	2	3	4	5	6	7	8	9
Landscape	City centre			Industrial	City	Industrial	City	Industrial	Residential
					centre		centre		
Time of day	Daytime			Gradually getting darker				Night-time	
Passenger number	Few	Ma	any	Few					None
Passenger	Mind their own business			Anti-social			No other		
behaviour				passeng			passenger		
Human	Present			Absent					
assistant									





Some of our takeaways



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1) Experiencing CCAM alleviates safety concerns, but security, speed, and onboard space challenges remains

PRE-EVENT SURVEY

Top 3 citizens concerns

80%70%45%Traffic
safetyLegal
liabilitySoftware
failures

AFTER TESTING AV BUS

Main citizens concerns

80% 17% 9% Crime & Software Traffic anti-social failure safety behaviour

Sample: 35 citizens





2) Intention to use CCAV increases after experimenting onboard conditions

Evolution of intention to use and buy



Key Insights

- Intention to buy an AV car increased six times
- All respondents would use the Delivery Robot
- At least 2/3 of participants will use a CCAV again if possible



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3) There is high potential for onboard entertainment or engagement activities

CHOICES FOR TRAVEL TIME

BUS	69%	10%	21%	•
	Look around	Work	Entertainment	
	68%	12%	20%	

Key Insights

- 20% of users would engage in entertainment activities presenting onboard gamification opportunities
- ca. 10% of users would work while commuting in an AV





Conclusions

1) Security, speed, and onboard space challenges remains



Communicate security enhancing attributes in CCAM is important to bridge concerns.

2) Intention to use CCAV increases after experimenting onboard conditions



Appropiate business models are needed to capture future CCAM services/vehicles

3) There is high potential for onboard entertainment or engagement activities



Opportunity to take advantage of idle time while onboard. Travel experience will be more important.



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THANK YOU

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BREAKOUTS

TIME	Breakouts: How can defined projects' results be integrated into Cluster 1 and Cluster 7 future calls for projects?
14:15-14:30	Coffee break & transfer
14:30-16:05	 Switch between the groups after 45 minutes. Possible to attend 2 groups. Cluster 1 Large-scale demonstrations (Baekeland -1) Cluster 6 Societal readiness aspects to impact large-scale demonstrations (Edison) Cluster 7 Coordination (Darwin)

UPCOMING PUBLIC EVENTS



Conference on the Results from the Road Transport Research (RTR) 11-13 February 2025 Brussels, Belgium



Conference on Connected and Automated Driving 13-15 May 2025 Ispra, Italy



CLOSING: KEY TAKEAWAYS

Straight and frank statements made:

Level 5 will never come and do not rely on quick scaling of flying-cars Level 4 will need support from infrastructure

Large scale demo:

- Safety and security is second to none
- > means not necessarily 1000 vehicle but definitely more than 5 vehicles
- decisive is ODD coverage including cross boarder applications to push harmonisation process of EU-states
- > Be aware of still existing technical limitations



Cluster 2 – vehicle technology Be aware of still existing technical limitations Make safety the top priority, take security seriously Make the ODD large scale (not only focus on number of vehicles): mixed traffic, adversarial weather conditions Vehicle system for mixed traffic and cross boarder traffic Provide redundancy of sensors (cover edge cases) Interplay of sensors and processors Assess energy usage of CAD systems Cost vs. performance of sensors Build trust of users in-vehicle and on the road Involve users in human-centric developments Co-designing Al/SW and electronics for SDV



Cluster 3 Validation

- > Type approval not needed, but assessment framework for integrating vehicles in demonstrations
- Large amount of member states: obtain exemption for test vehicles is not easy to obtain -> harmonization cross states is step towards harmonized type approval

Cluster 4 Integrating CCAM in transport system

- What to include in LSDemo: ODDs, cross-boarder, which services and modalities? Not necessarily 1000vehicles, but more than 5 vehicles...
- > Determining: how many people to be involved
- > Bizz-models aspects: plan how to justify investment for and how to apply PDI
- > Trusting external data sources justified trust of data coming from other vehicle and infrastructure



Cluster 5 key enabling technologies

- high need for real-world validation scenarios
- > Trust: e.g. AI aspects: safe enough from the view of engineers but also from perspective of users
- what's the scalability of trustworthy AI in real-world applications? Data and AI model requirements and specifications; data is partly available, partly missing

Cluster 6 results: Societal aspects and people needs

- Inclusiveness, entertainment or engagements activities; speed matters!
- Large scale is not number of cars
- > Duration of operation: it takes time to get users on board various speeds wrt time to adaption
- Challenge: usage of toolkits shall be encouraged







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CCAM