CCAM MULTI-CLUSTER MEETING

OUTCOMES

31 March 2022
Brussels

The first Multi-cluster meeting gathered more than 100 participants in Brussels on 31 March. It gave CCAM members the much-awaited opportunity to reconnect after a long period of online meetings, while actively engaging in the 7 CCAM Clusters' work and reflections. Members appreciated the possibility to get directly involved and to suggest future activities and developments in CCAM, at both operational and strategic levels.

Philippe Froissard (European Commission, DG RTD) and **Armin Gräter** (CCAM Chairman) kicked-off the event by highlighting the role of the CCAM Partnership and Clusters in approaching the future challenges in EU Road Transport Research and Innovation.

Aria Etemad (Volkswagen) presented the H2020-funded project called Hi-Drive, in which several CCAM members take part. Building on the results of L3Pilot, the project focuses on testing, demonstrating, and evaluating high automation functions in a large set of traffic environments.

Most of the day was devoted to taking stock of the CCAM Clusters' first achievements and ongoing initiatives, as well as their contributions to defining the CCAM-related Horizon Europe Work Programmes. Attendees participated in break-out sessions (World Café) where they discussed with Cluster Leaders on what should be developed further in the Strategic Research and Innovation Agenda (SRIA roadmap) and Horizon Europe Work Programmes. Key takeaways (in more detail below) were reported by **Cluster Leaders and Co-Leaders** in a panel discussion. As a general comment, Cluster Leaders were very satisfied to see all stakeholders represented during the discussions, and thankful for the feedback received.

Ludger Rogge (European Commission, DG RTD) gave an update on Horizon Europe Work Programme 2023-2024. He underlined the possibility for the CCAM Association to react to the comments that Member States will make on the second draft, in the end of April. The Work Programme will be finalized in June-July and calls 2023 will be published by the end of the year.

In his final remarks, **Geert Van der Linden** (European Commission, DG MOVE) said that he was pleased to see such an interaction between CCAM Clusters, and no separate silos which could lead to miscommunication and lack of coordination. Ludger Rogge closed this fruitful meeting by encouraging the CCAM Association to already look into the next and last phases of the CCAM Partnership, with a focus on large-scale demonstrations and involvement of Member States.

KEY TAKEAWAYS FROM CCAM 7 CLUSTERS WORLD CAFÉ

The purposes of the World Café conversations were to (a) finetune each Cluster's topics in WP23-24, (b) identify gaps to be covered for the next Work Programme, and (c) begin to address the SRIA update, in more strategic terms.

Highlights from the discussions are listed below for each Cluster. Individual written contributions were gathered during the meeting and are attached in Annex to this report.

CLUSTER 1 – LARGE-SCALE DEMONSTRATIONS

Co-Leader: Henriette Cornet

Key takeaways for WP23-24

The discussions mainly focussed on the coming joint topic with the Cities Mission and the 2Zero Partnership.

↗ From the Cities' Mission perspective, it was reminded that the needs of the cities should be in the foreground, e.g.:
- What a smart city is from the applicants' perspective
- What the desirable scenarios are for the future
- How CCAM can help reach the SUMPs
- How to increase vehicle occupancy and thus reduce the number of private cars in the city

↗ From the 2Zero Partnership's perspective, it should be investigated how CCAM impacts the needs for charging infrastructure

Gaps identified and to be covered for the next Work Programme

↗ The calls should consider the needed adaptation to local geopolitical situations that affect cities' needs (e.g. refugees, pandemic situation)

↗ Assuming that CCAM is electric mobility, a clear link should be made with the energy system: when to charge, type of energy, costs of energy, battery management…

↗ Make sure to consider goods transport
- Link with retailers / e-commerce actors is essential
- Link with vulnerable users who rely on e-commerce
- Link with cities regulations

↗ Level of automation should be clearly stated in the calls

↗ Assessment of societal/governance readiness of cities
- For which CCAM systems?
- For every territory?

Influence on the eventual update of the SRIA in the future – at more strategic level

↗ Transfer of knowledge within cities, road & PT authorities is essential
- Leverage on known impacts from previous projects
- Validate previous assumptions
- Update / upscale the models, consolidate the metrics on impacts for externalities and benefits
- Improve harmonization

↗ Definition of terms: Remote mobility is different from automated mobility
- Define clearly the role of remote operators
- Guidance is expected towards the need of infrastructure

↗ Need for consistency, interoperability for resilient mobility systems

CLUSTER 2 - VEHICLE TECHNOLOGIES
Leader: David Storer - Co-Leader: Gereon Meyer

Discussions' highlights:

↗ Vehicle Technologies (general or not addressing a specific Area)

- Resilient System Design
- Standardisation should be an integrated part in the whole Cluster, based on best practises
- Life cycle management to predict obsoletion/degradation and to schedule updates of hardware
- Bring to CAVs connected predictive maintenance solutions for all safety parts
- Scalable/Down-sizable architectures to be used by many OEMs (including smaller vehicles)
- Extend the scope to ADAS and partial automation (L1/2/3)
- Interface between technologies
- Holistic solution (page 58 of the SRIA) is not addressed at the moment
- Technologies to support V2I/V2V are missing

↗ Cooperative perception (also to support in the case of harsh weather/sensor obstruction)
- How the Infrastructure can send the data and how the user can understand the information shared.
- Which type of Data can be used to support the technologies in the vehicle?

↗ Perception
- Resilient perception systems that are safe and fail operational
- Definition of sensor coverages that are proven to allow for different autonomous functions

↗ User-Centric development
- Display the vehicle perception (and prediction) through the HMI as a way to enable trust in CAVs (situation awareness).
- Redesign of HMI with a minimalistic approach to remove buttons that are not necessary anymore.
- It should also consider the safety of external people
- Reliable technologies to ensure a safe interaction with the other road users
- Design of sensors and perception technologies to ensure safe and trusted user experience
- Recognition of sentiments – solutions for biometric facial recognition
- Standardisation in the user centred design (including the functional logic of the vehicle). To be considered also for validation
- Importance of definition of attributes and metrics for user needs
- System approach to solve complex human/technology interaction

↗ On-Board Decision Making
- Which are the priority data that the system should receive to mitigate or predict a risk?
- More powerful hardware
- Quantum Computing
- Path planning
- Data driven development

- Definition of System Architectures that are proven to allow for different autonomous functions
- Balance On-Board Decision Making considering all the interdependencies
- To use "route forecasting" to understand when the vehicle could potentially go out from its ODD. In vehicle sensing can corelate those forecasts.

↗ HMI
- Standardisation activities – also to enable driver interaction across different SAE Levels
- Making sure that the user can interact with the vehicle even if he/she has not digital skills
- Hand over procedures when the limit of the ODD is approaching

CLUSTER 3 – VALIDATION

Leader: Peter Urban - Co-Leader: Bastiaan Krosse

Key takeaways for WP23-24

↗ General agreement of participants with the Cluster 3 contents in WP23-24, but some good feedback and discussion on wording in detail, e.g. regarding the understanding of "edge cases" and "traffic data"

➔ Very much appreciated input for fine-tuning the topic descriptions in next iteration loop with the EC in order to avoid possible misunderstandings

↗ Multiple relevant datasets, tools and methods are already available among members of the CCAM association and could be made use of when answering the call topics in WP23-24, e.g. from L3Pilot, Hi-Drive, UDRIVE and V&V Methoden

Gaps identified and to be covered for the next Work Programme

↗ Ca. 30 postcards with gaps and further contributions received with good discussions on some of them, e.g. regarding potential standardization and validation of HMI and the full implications of V2X communication in the further development of validation methods

➔ Details: see the annex of the report
➔ Very valuable input for Cluster Leader and Co-Leader to structure, consolidate and use as the basis for further discussions with association members and for updating the SRIA in view of the last years of Horizon Europe

Influence on the eventual update of the SRIA in the future – at more strategic level

↗ Need for the development of a consolidated view on standardization needs with regard to HMI in the context of CCAM

↗ Possible content-related extension of Cluster 3 Validation cluster from safety assurance to the validation of other properties of CCAM systems not related to safety

Inputs at more strategic level beyond the scope of Cluster 3:

↗ Interest in collaboration with non-associated third countries that are currently not mentioned as preferred cooperation partners in view of the EU's strategic autonomy

↗ Need to include lower levels of automation than L4 in the CCAM Partnership (or with significant funding in other parts of Destination 6)

CLUSTER 4 – INTEGRATING VEHICLES IN THE TRANSPORT SYSTEM

Leader: Torsten Geissler - Co-Leader: Johanna Tzanidaki

Key takeaways for WP23-24

↗ Parallelity of actions: sequentiality vs parallelity: Parallel evolution of actions/Clusters – is it sequential, with one Cluster ending where another starts? Challenging to have overlapping actions, feeling that everything is happening at the same time

↗ Input-Output relation: duality (particular for integration challenge): Duality input/output contradiction, particular challenge for the Cluster 4 (integration): vehicles/ infrastructure

↗ Mixed traffic and discussions about geofencing: how far is all this aiding mobility? Interdependence of social/technical and regulatory systems ➔ Societal readiness level. Regulation is also evolving and is also shaping the technological part

Gaps identified and to be covered for the next Work Programme

See written contributions in annex

Influence on the eventual update of the SRIA in the future – at more strategic level

↗ Digital traffic rules and geofencing

↗ Other modes: rail and water- all modes should be considered within the CCAM system

↗ Consider services on Public Authorities needs/city needs

↗ Not only Infrastructure-to-Vehicle but also Vehicle-to-Infrastructure ➔ to build new services to see on what level the collaboration between public and private can be built

↗ Data exchange and content

↗ Societal readiness levels (SRL)➔ infrastructure to host CCAM-enabled vehicles

↗ Only vehicles reading VRUs (not infrastructure)

↗ Green Deal: new services for green targets

↗ First overview for kind of data to be ready to orchestrate (re-emphasise orchestration)

↗ Holistic perspective

↗ Fragmented market➔ legal framework

↗ Important for cities➔ enabling factors

↗ Connecting to MaaS

↗ Data quality needs

CLUSTER 5 – KEY ENABLING TECHNOLOGIES

Leader: Margriet Van Schijndel

Key takeaways for Cluster 5 for WP23-24

Topics are well described, and the cross-cluster collaboration is appreciated (esp. Cluster 2 and 3 were mentioned).

On the cross-cluster topic, it was mentioned that it should be clear what the data and scenarios are to be used for (development, testing, validation), as this is key input for its definition.

With Cluster 2, the link could be strengthened on on-board computational power.

Gaps identified and to be covered for the next Work Programme

↗ Connectivity and its reliability are slightly under-stressed, what to do when connectivity fails. This could be linked to e.g. functional safety. Furthermore, the cross-border issue may be included more explicitly, as well as demonstration of system resilience.

↗ The capturing of data and scenarios for testing and validation, based on real traffic data, was stressed several times. Another related issue is the annotation of data: who will be doing that, and how? Can AI be instrumental, also to bring down the immense costs? How to establish shared databases of annotated data?

↗ Another gap, slightly beyond the Work Programme, is the engagement of authorities and road operators in e.g. their governance role

↗ Cybersecurity – which are the specific CCAM issues to address that are not already done elsewhere

↗ How to come to Standardisation and harmonization?

Influence on the eventual update of the SRIA in the future – at more strategic level

↗ The topic of "going beyond collective perception": It would be good to jointly describe, also based on expressed needs and concerns, what could be the next steps (including e.g. path prediction)

↗ A more detailed insight in how AI can improve the overall system would be good, moving beyond individual vehicles, taking also into account the user. Edge AI will have to be included in an update. Explainability of AI is highly relevant

↗ Discussion will be needed, in a multi-cluster approach, on joint understanding regarding the required or expected maturity of key technologies, as well as related time frames

↗ From big data to smart data: find a balance between necessary level of detail for contextual awareness/ elements for edge case/ scenario description and associated costs

↗ Collaboration between Horizon Europe Partnerships, align SRIAs with other partnerships e.g. ADRA, KDT, Chips JU

CLUSTER 6 – SOCIETAL ASPECTS AND USER NEEDS

Leader: Ingrid Skogsmo – Co-Leader: Suzanne Hoadley

Key takeaways for WP23-24

↗ There is a perceived gap in the Cluster 6 topics regarding how shared mobility and goods are addressed.
  o Shared mobility and goods are both mentioned in the Scope of D6-1-9 "Jobs".
  o **Action**: Even if we consider Cluster 6 "service-agnostic" (as well as "technology-agnostic"), it is proposed to explicit mention shared mobility and goods in one of the scope bullets in D6-1-8 ("Diversity")

↗ **"Multi-label" diversity** (consider more than one aspect of diversity) was recommended for D6-1-8 "Diversity" to enhance the impact of solutions.
  o **Action:** Additional wording is proposed in D6-1-8 ("Diversity")

↗ **"Marketing" and "communication"** aspects are considered missing, and it is noted that communication strategies are often "old".
  o **Action:** Addition of communications skill into D6-1-9 ("Jobs") is proposed

↗ The importance to consider **users in a broader term** (citizens, control centers, fleet managers) was pointed out.
  o The "Full range of professionals" is reflected at different places in the scope of D6-1-9 ("Jobs").

↗ **Implement developed, existing methodologies** for user engagement and implementation tools for user-centred CCAM solutions that effectively contribute to societal targets & CCAM uptake!
  o **Action:** Give input to update WP24 topics' wordings when the projects awarded in 2021-2022 calls are known. Take stock of planned content and, if available, results

Proposed items mentioned above have been introduced into CCAM's document for input to the 3rd WP draft.

Gaps identified and to be covered for the next Work Programme

↗ Better understanding of factors determining travel behaviour and needs (users, public needs) with potential relevance to CCAM.

↗ Identification and understanding of **behavioural dynamics** which are the basics for the assumptions in impact methodologies (e.g. number of cars, car ownership, modal shift, number of kilometres driven).

↗ The concrete example of goods was given:
  Gap: The lacking focus of goods both in urban areas and non-urban: in 2035, 50% of consumption is projected to be done online. Deliveries make it possible to reduce the need for the personal car and can increase efficiency in the city. We might not always need to travel.

↗ It was noted that there has to be a **continuity of assessing social aspects**; not just a preparation of deployment, but as integral part of a functioning ecosystem, as needs change because attitudes change, situations change etc.
  o The 2021 topic on Impact has in its scope to develop more comprehensive assessment methods of CCAM that address the needs and dynamics of a society in transition

- *Action*: Depending on the projects awarded in the 2021 Impacts and Needs topic, the "dynamics" aspect may be considered for SRIA update and for defining WP25-26, e.g. by including into topics:
  - Methodologies for accounting for dynamics, using dynamics in assumptions
  - Mechanisms for corrective actions if desired impacts are not on route to be achieved

↗ **Citizens engagement:**
- Who are we targeting? Do we know enough about target groups?
- When do we engage with stakeholders, users, people? At low or high TRL levels?
- Make use of existing citizens engagement (co-creation) methodologies!
  - *Action:* Depending on the projects awarded in the 2021 Needs topic, these aspects may need to be considered in development of WP25-26
    For discussion with Cluster 7 and Cluster 1.

Influence on the eventual update of the SRIA in the future – at more strategic level

↗ **KPIs and metrics:**
- KPI that address willingness to use is mentioned as a gap.
- Is there a need for Metrics for the assessment of "Sustainability"?
  - *Action:* The SRIA update should take stock of recommendations from WP2021-topic on Impacts, as well as results from other CCAM projects that may provide input to a KPI review

↗ Mechanisms for ensuring **equity** by pre-conditioning cherry-picking of CCAM deployment and operations with obligations (e.g. in some cities a micro-mobility operator that wants to provide micro-mobility in certain part of city also has to provide services in areas which are underserviced by public transportation).

↗ **Scenarios and Movement trends -** for consideration in SRIA and WP25-26.
- To guide the Partnership and the demonstrator projects towards targets for 2030 it was proposed to agree on 2-3 main scenarios (based on aggregating all work done on impact), to have a common viewpoint of scenarios and metrics in future projects.
- This would enable comparison throughout CCAM, and avoid that every project has to start from scratch by developing its own (micro) scenarios.
  - *Action:* The SRIA update should take stock of recommendations from WP2021-topic on Impacts, as well as results from other CCAM projects that may provide input to a KPI review
  - *Action:* discuss idea about common scenario with CCAM Partnership Executive Group

CLUSTER 7 – COORDINATION

Leader: Stephane Dreher

Key takeaways for WP23-24

The discussion in the Cluster 7 breakout sessions confirmed that Cluster 7 is expected to support all other clusters. Matters that have been discussed concerned Cluster 6 (citizens engagement), Cluster 3 (scenarios and edge cases data bases) and Cluster 4 (common definitions for the infrastructure).

Societal aspects

Societal aspects have been discussed in the frame of the Knowledge Base evolution. The current plan for WP23-23 is to open up the Knowledge Base for non-experts, i.e. citizens and also serve as a means to collect and publish data about the level of awareness of CCAM from citizens and decision makers.

Societal aspects need to be addressed at different levels:
- Users
- Citizens
- Policy
- Industry

It is important to include the needs of citizens also when developing policies. We can learn from micro-mobility, which was not regulated in most places and its development has then been driven by society.

If the future Knowledge Base targets non-experts, some specific aspects need to be considered:
- Vocabulary (the working might need to be different)
- How to deal with different opinions. A common ground needs to be found about what will be communicated (e.g. the EU-funded Hi-Drive project is looking into such questions)
- Need to liaise with other groups working on societal aspects (e.g. PAVE Europe, national initiatives)
- The EUCAD conference could be open to a wider public

Common methodology and practices

Cluster 7 does not have the ambition to create something new, but rather to gather what exists already and share it as broadly as possible. The Hi-Drive project for example is developing a code of practice for the testing permission and approval process and an alignment will be required with the Cluster 7 project developing and maintaining the Common evaluation methodology. Cluster 7 could take a wider view to allow scaling up, as Hi-Drive is focusing on cars.

The Knowledge Base should also not directly host data. Large datasets could be hosted in a dedicated database from the European Commission.

It would be important to ensure that WP 2023-24 projects use the methodology that has been developed, so that results can be compared afterwards. The use of the methodology would need to be mandated in the calls directly.

Member states perspective

Further reflection is needed on how Member States can be involved. The current WP23-WP4 draft call states that the project should support the Member States Representatives Group but it is not clear now how the work of this group can be best facilitated.

Data access

Regarding data access, Cluster 7 projects could provide guidelines and gather experience related to commercial and competitive value of data sets. Key questions are in particular how to safeguard the Intellectual property of those who produce the data, the aggregation level and the extraction of edge cases.

Link with other domains/ partnerships

A question that has been raised in the group is the link and collaboration with other domains and partnerships. The link is currently considered at the level of the different Clusters depending on the topic of cooperation. So far, Cluster 7 has only investigated the possibilities for linking with the Digital Europe Programme for the call related to the data sharing framework. This call has eventually been cancelled with the expectations that CCAM related matters will be taken over by the Digital Europe Programme in the calls for the Mobility Data Space. There is however no confirmation of this currently and there is a risk that there will be no follow up for the CCAM Test Data sharing Framework after the project currently funded under the 2021-2022 call.

Gaps identified and to be covered for the next Work Programme

↗ Societal aspects need to be addressed at different levels. The target groups need to be identified. At least the different groups should be considered: Users, Citizens, Policy makers, Industry

↗ When do we engage with stakeholders, users, and people? At low or high TRL levels? (from Cluster 6)

↗ Gather and make use of existing citizens engagement (co-creation) methodologies (combined Cluster 6 and 7 target)

↗ Liaison with other groups working on societal aspects should be included (for Cluster 6)

↗ The Knowledge Base follow-up activity should include definition of vocabulary to address different target groups (including non-experts) and a common ground on what will be communicated

↗ Provision of guidelines and experience related to commercial and competitive value of data sets

Influence on the update of the SRIA in the future – at more strategic level

↗ A stronger link is required with Cluster 6 as a few topics common to both Clusters have been discussed in the two breakout groups. Alignment would be required on the target groups, and on the TRL level at which citizens should be engaged

↗ In its coordination role, Cluster 7 could take a more central position for the links to other domains and partnerships. At the moment, this link is made by the different clusters according to the needs of the call topics

↗ Further reflection is needed on how Member States can be involved and how Cluster 7 and related future projects can support the activities of the Members States Representatives Group.

↗ Need to mandate in the calls the use of common tools and methodologies developed by Cluster 7 project
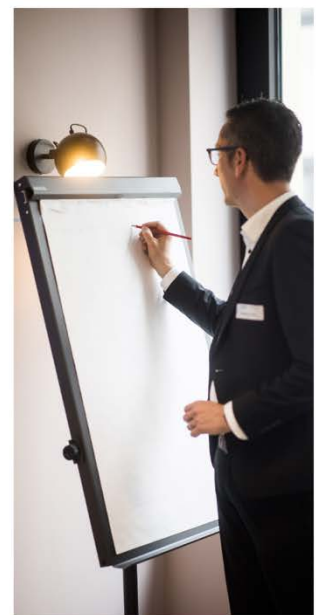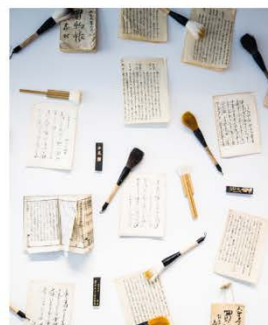
TRANSCRIPT OF PARTICIPANTS' WRITTEN CONTRIBUTIONS (POSTCARDS)

Cluster 1 – Large-scale demonstrations

Name & Organisation	Identified Gaps
Vasilis Sourlas, ICCS Greece v.sourlas@iccs.gr	Too difficult for cities to build a fleet of AVs. As such, having 2-3 AVs does not allow to have measurable impact in the cities services. Contradicting to have 2Zero targets with increased introduction of L3-L4 AVs in the same call.
Davide Lo Presti, University (& City) of Palermo **Davide.lopresti@unipa.it**	Scenario development must be included as a first step to agree with cities on how we want the urban mobility in 2030 -> 2050 -> beyond. Technology development must be framed within these roadmaps. I will be glad to lead / participate in a WP looking at that with City of Palermo too.
Giulia Renzi, ICOOR **Giulia.renzi@icoor.it**	Create a system of "keywords" so that it could be easier to find projects ongoing
Ingrid Skogsmo, VTI **ingrid.skogsmo@vti.se**	↗ Automation is more complex than we all thought, and industry is not at all where promised a couple of years ago. Could it be that there has been a high focus on innovation and implementation – do a backtrack of research undertaken and see how we can ensure that we have the right programmes that develop the fundamentals and the technology that is needed! (could actually be something that goes across several modes!) ↗ Increase focus on commercial vehicles!
Anonymous (through Cluster 6)	How to link social benefits of costs of CCAM to Sustainable Rural Mobility Plans, with a methodology that is shared by all stakeholders, because in the end CCAM will need to be integrated in Sustainable Mobility Plans, we need to help territories to choose the best way to do that.

Name & Organisation	Identified Gaps
Anonymous (through Cluster 6)	Addressing willingness to use and adoption – and assess it within the project. The joint topic includes impact assessment, C/B assessment, and it is said that " The published 'CIVITAS Process and Impact Evaluation Framework' should be used to evaluate the impact of the solutions. This should be accompanied by mechanisms for common lesson drawing and learning". Depending on how "user centered" you plan this to be, would there be a point in being explicit about end-users and involved professionals in the Cluster 1 topic?

Cluster 2 - Vehicle Technologies

Name & Organisation	Identified Gaps	Contributions
Ingrid Skogsmo **VTI** **Contributions coming from discussions in Cluster 6**	↗ Remote operations of heavy vehicles, and the associated HMI ↗ On-board experience and TRUST – also taking into account organisational culture	↗ REDO Remote Driving operations -- https://www.vti.se/en/research/vehicle-technology-and-driving-simulation/project-redo ↗ Several national studies on safety culture, also in an automation context. Example: "Safety culture in bus companies" Christina Stave (VTI), Anna Vadeby (VTI) and Per Henriksson (VTI) (report in Swedish is available).
Mehrdad Dianati **University of Warwick + WMG** **m.dianati@warwick.ac.uk**	↗ Sensors ↗ Resilient system design ↗ V2X Comms	Related projects: CARMA (Cloud-Assisted Real-time Methods for Autonomy), Hi-Drive, L3Pilot
Knut Evensen **Norwegian Public Roads Adm.** **Knut.evensen@mobility.no**	↗ The authority role for integrating vehicle content with the infrastructure also require significant RIA. ↗ HMI standardisation for L2 and L3 operation. Divergence and lack of transparency is a safety hazard. Needs RIA.	
Javier Romo **Cidaut** **javrom@cidaut.es**	To facilitate/ensure that solutions are the least dependant possible on "digital" skills	
Etienne Arbogast **Covea Assurance** **Etienne.arbogast@covea.fr**	↗ Does HMI solutions topic deal with the ability/time for the user to take control back of the car between ODDs? ↗ Does Cluster 2 cope with on-board computational power needed for AI operations?	

Name & Organisation	Identified Gaps	Contributions
Lucia Sanz **Altran (Capgemini Engineering)** **Lucia.sanz-pardo@capgemini.com**	Include safety of surrounding human users (VRUs, human drivers) when considering the user-centered developments, to ensure that there are no "side-effects" when trying to improve user acceptance	
Eckard Steiger **Bosch** **Eckard.steiger@de.bosch.com**	Data driven development should "happen" in Cluster 2 as well! ➔ "In vehicle" important as architecture but as "process" as well. ➔ user centric (field data base for development)	
Ragnhild Wahl **ITS Norway** **Ragnhild.wahl@its-norway.no**	↗Standardisation should be an integrated part in the whole Cluster. Based on best practice. It enables efficient planning and integration, and it is an important foundation for business development and industrialization. E.g. HMI standardization (when applicable), data exchange,… The idea is to build a knowledge base for decision-making process. ↗Ensure automated transport services don't take over walking because it is easier. We need to consider health (this might "belong" to the Cities Mission)	

Name & Organisation	Identified Gaps	Contributions
Norbert Hainitz **AIT, Austrian Institute of** **Technology. Center for Vision,** **Automation and Control.** **Norbert.hainitz@ait.ac.at**		Perception, localization, in harsh environments Machine learning, sensor fusion, mobile machines, trams, aviation, military vehicles experience from sensor to decisions, etc. KDT, EFFRA
Gunny Dhadyalla **Techworks Hub** **Gunny.dhadyalla@techworks.org.uk**	**User centric development** ↗ Importance of defining attributes and metrics for user needs e.g. availability, ease-of-use, surprise/delight, trustworthy etc. ↗ Systems approach to solve complex human/technology interaction ↗ "Perception-focused solutions" to include novel/innovative interface technology-embedded sensing, gesture, user awareness, bio motives tec to make it technology-centric **Architectures** ↗ Up-scalable and down-sizeable architectures – meaning architectures accessible by … OEMs, freight OEMs and smaller …-vehicles-… to minimum viable architecture that can provide broadest reach. ↗ Lifecycle management of systems e.g. degradation of sensors over time and updates to systems over time ↗ Resilience and system recoverability including distributed risk, risk minimization for large fleet vehicles	

Name & Organisation	Identified Gaps	Contributions
Huawei Sweden **Hossein Nemati** **Hossein.nemati@huawei.com**	↗ There are aspects of previous calls such as in WP21 & WP22 which directly affect the user experience. Aspects such as sensor and perception technologies to ensure safe, continuous and trusted user experience in different ODDs. It would be great if the efforts in WP23 could still allow new proposals with focus on these technologies. ↗ Could we consider chip technologies within this Cluster (in future plans)?	
Andree Hohm **Continental** **andreehohm@continental.com**	Extrapolation of WP21 "when is the perception powerful and reliable enough?" → define "sensor coverages" and "system architectures" that are proven to allow for different autonomous functions	
Philippe Lallement **Michelin** **Philippe.lallement@michelin.com**	→ Bringing to the CCAM vehicle connected predictive mainetance solutions for all safety parts * *other than "piloting support sensors" (Lidar, radar, camera…)* Reliable technologies to ensure a safe interaction with other road users	Interface between technologies
Miriam Villaverde **NTTD** **Miriam.villaverde@nttdata.com**	Balance decision-making considering all the interdisciplines (safety, cybersecurity, interoperability, …)	
Patricia Jiménez **NTTData** **Patricia.jimenez@nttdata.com**	Importance of human factor and solutions for biometric facial recognition	

Name & Organisation	Identified Gaps	Contributions
Rino Brouwer **Netherlands Ministry of Infrastructure and Water Management** **Rino.brouwer@rws.nl**	1- User-centred design process for ADS → common between OEMs 2- Commonality between brands on HMI → incl. functional logic of the ADS 3- 1 & 2 also highly relevant fir validation & type approval!	
Oliver Carsten **ITS-Leeds**	A comprehensive solution for common harmonised HMI for driver interaction with the vehicles across level 0 through 4. Parts have been addressed in the first 2 calls. Validation is covered in the 2023 call, but a holistic solution is nowhere addressed. Page 58 of the SRIA covers this need.	
Stefan Nord **RISE** **Stefan.nord@ri.se**	I am missing aspects on technologies supporting V2V/V2I, integrating e.g. sensor data from other vehicles or infrastructure for cooperative perception or awareness. Now it is only perception based on on-board sensor.	
Richard Morris **Innovate UK** **Richard.morris@iuk.ukri.org**	Weather "route forecasting" to determine risk of AV exceeding its ODD → improved by "on vehicle" sensing to corelate these forecasts	Don't forget quantum is coming! Items like PKI for cybersecurity may become "unsafe" overnight, but transform on vehicle computing.

Name & Organisation	Identified Gaps	Contributions
Kevin Tammearu **Bercman Technologies** **Kevin.tammearu@bercman.com**	There is currently a lack of clarity on how the handover from RSI to the vehicle takes place in collective perception and from that, how the user can understand the information coming from outside sources	
Roberto Blanco **CTAG** **Roberto.blanco@ctag.com**		Related with the topic of user-centric development: ↗ Display the vehicle perception helps to increase the sensation of safety in the mass users, who are not close to AD technology ↗ Think from the other side "what should we remove from the vehicle?" There are lot of switches which are not needed anymore ↗ Evaluate it from different perspectives, beyond engineers
Jochem Brouwer **TNO** **Jochem.brouwer@TNO.nl**	Environmental perception/ prediction for forecasting Situational awareness (which is now covered as Cluster 5)	
Andrea Soncin **Here Technologies** **Andrea.soncin@here.com**	Which are the priority data that the car system should receive to mitigate or predict a risk? Or which type of data can be used to support the technology in the vehicle?	

Cluster 3 – Validation

GAPS

HMI:

- ↗ HMI validation is a large topic on its own. Should not be a sub-topic.
- ↗ Not only HMI for a specific level of automation, but for the whole HMI
- ↗ Develop metrics and criteria for safe driving, traffic safety & HMI
- ↗ HMI and resilience: how do we build in resilient HMI that make it safer. A more positive experience for the user or not to add more risk of Tesla central touchscreen can create "eyes -off" road risks
- ↗ Validation of HIM could be design agnostic, but from the user perspective, that would create huge usability problems. The need for a harmonized HMI is now recognized by the regulators and the SRIA. So first we need to develop harmonized design and then we need to validate.

Remote operation:

- ↗ Validation of remote operation
  - ○ Connectivity: bandwidth, latency, coverage, etc.
  - ○ Type of operation: Yes-proceed, Full DDT)
  - ○ Training + licensing of operator
  - ○ One driver to how many vehicles?
- ↗ For example, safety validation of remote driving use case could be one of the future use case on top of automated driving could be explored in the future. This is, for instance, if some of the functionality in vehicle is moved outside a vehicle and the vehicle is then controlled partly from a cloud service (centralized

control approach). This then can be connected to other Clusters that look at system perspective, cybersecurity, etc.
- ↗ Evaluation / safety validation of remote operation

Specific conditions, vehicles, environments:

- ↗ Off road vehicles & ODD
- ↗ VRU testing: certified or standardized VRU definitions and models approved to test systems
- ↗ Component approval of safety critical sensors

Simulation:

- ↗ The aim is to have the possibility to simulate V2V communication e.g. in hardware in the loop.
- ↗ Test space explosion with coverage is a massive risk to operation, resources. So there needs to be research / innovation to manage test space across simulation: HIL … real world whilst still assuring safety, resilience.
- ↗ Virtual: tool certification. How can I trust my synthetic world to assure my system?
- ↗ How much are simulation tools accepted by people
- ↗ What can we do to let the people, users, stakeholders, trust the simulations tools?
- ↗ It would be great if convergence (standardization/certification) could be achieved in the virtual testing and simulation particularly for sensor modeling (lidar, radar, …) and target and environment modeling. This could enable more trust for simulations across the whole chain. In the telecom domain, for example, there are acceptable models for propagation and

environment. But in automotive domain, every player tries their own methods and there is not any general / overall acceptance.
- I believe a stronger dissemination of the projects (especially of the simulation tools) is needed

Validation w.r.t. vehicle in operation

- Validation for OEM differs from operation
- Challenges with validation and continuous deployment (upgrading vehicle functionality via SW)
- Vehicle safety inspections driving vehicle lifetime
- More focus on mixed traffic, where evolving technologies co-exist
- Need to evaluate ADS efficiency in naturalistic driving data
- Define some feedback loop coming from the operation in real life
- Continuous compliance vs safe enough. If the definition of safe enough involves continuous assessment (based on real-world data)=> the compliance criteria changes => how to address "traditional" type approval approach
- Use efficiency measurement (of ADS) on open road to update validation scenarios.

Strategic / fundamentals on the validation approach

- CCAM target EU, how to align with other region
- Sharing of learning from issues vs business confidentiality (trustee role)
- Validation timeline without putting pressure on projects
- EU organization of a "minimum" set of scenarios (minimum = type approval scenario)
- Validate also from type approval perspective
- Metrics and standards to provide statistical evidence
- How to create "certified" evidence for creating safety argument.

- How to handle such big quantity of data?
- Tool quality: need to create clear metrics and performance expectations from test/validation tools
- Strengthen the connection between validation and standardization of validation methods
- Impacts on traffic level performance should be involved as part of validation process (example: ACC that reduces road capacities)
- Mix pre-set trajectory EGO with independent vehicle
- The mapping of subjective user requirements to objective system/engineering requirements and how to validate both.
- Rulebook: KPI & SPI: for the validation of CCAM systems. So tools can show statistical significance of performance indicators.

Scenario based:

- Testing of systems focusses on challenging scenarios but different AI may be challenged in a different way
- How to ensure all the possible scenarios are tested in the cloud before bringing to the road.
- Quantify representativity of driving/ crash/ near crash data used to provide validation scenario
- Coverage and completeness of database. The WPs discuss the identification of scenarios, but how do you know if your database is complete?
- Identify meaningful data to describe scenario
- Aligning minimum sets of scenarios with standardized ODDs

Connectivity:

- Tweaking commercial mobile networks to resemble "the future" instead of treating FOT vehicles like smartphones
- Validation of "connected" vehicles application could be one of the future directions in this Cluster.
- Assure loaded networks while having only few FOT vehicles

Contributions

- In D, high D, round D Datasets: drone trajectory data sets
- VRU models and simulators
- OMEGA data format
- Advanced scenario engine out of V&V methods project
- Winter SIM
  - Digital twin for Aurora Intelligent Road
  - Authentic winter data collected year 21-22
  - Suitable for CARLA or for other applications
  - Vehicles can be tested virtually, later data can be validated in a real environment
- Experience from connectivity testing in aviation & maritime (little bit rail)
- Help in finding suitable 5G testbeds
- Technology tutorials
- Benchmarking semantic segmentation of perception using machine learning, use cases mobile machines, vehicles, trams

& trains, … . Vehicle simulation / modeling and identification of dangerous situations
- Commercialization of scenario databases. 2 directions exist: shared community of scenarios, commercial access to scenarios. We need both and to encourage business.
- Create a "shared" validation: different projects validate strategies, methodologies, tools developed in another project (output: higher reliability, cooperation, contamination, inclusion of different perspectives).
- IVEX.AI has tools to identify meaningful scenarios: challenging scenarios & underperformances of the CCAM system. We can incorporate performance indicators and show where the system is underperforming accordingly. We have our own KPIs, safety model, based on explainable AI.
- There is a "Future-proof methodologies for validation of CAV" group at SAFER
- VTI is running a project related to remote driving operation and can contribute experiences and results from this to Cluster 3.

Cluster 4 – Integrating vehicles in the transport system

Name/Organisation	Gaps	Contributions	Comments from Torsten Geissler (TG) and Johanna Tzanidaki (JT)
DRIVE Sweden Josephine Darlington	**Geofencing** and what is the expectation on cities and transport admin agencies to deliver **traffic rules** and support for ODD and fully	**Digital twins**: who will develop, maintain and update them and who will pay for this tool? How will these connect to other digital twins that developers are exploiting?	**JD:** Traffic rules are a recurrent comment
WMG, University of Warwick, UK Graham Lee		**Private campus and public road** (urban, rural, highway) testbed with infrastructure sensing comms **Infrastructure sensing** (object detection and identification) sharing of perception data via CPM (ITS-G5/DSRC) **Research vehicle** to develop tch and methodologies **High resolution scan** of testbed routes- digital twin for simulation-based testing	
ICCS, GR Vasilis Sourlas	**Not clear identification of the open connectivity issues** eg. hybrid comms, solutions for out of order message delivery, slicing, MEC **Not strong relation with SNS**, that is related to connectivity		**TG**: On the SNS relation, there are links and exchanges have taken place (esp. Clusters 4 and 5). Seems however from the Work Programme evolution that the vertical CCAM (use cases first) should not step too much in the field of the SNS JU (horizontal, technology first).

Name/Organisation	Gaps	Contributions	Comments from Torsten Geissler (TG) and Johanna Tzanidaki (JT)
TNO **Marcel Meeuwissen**	Outside-in approach, **start reasoning for societal and traffic level** and identify what this means for the vehicle level Mixed SAE-levels for the **next 30 years, how is the interaction**	**Advanced traffic safety modelling on vehicle and traffic and societal level**	
SINTEF **Per Lillestøl**	**Machine readable traffic regulations** (geofencing) **Position systems for tunnels** 23 Call: **consider RIA** instead of IA		**TG**: Sandwich position of the Cluster within CCAM-P implies focus on IA
Techworks/AESIN/Syselek **Alan Walker**	**PDI capability coverage** in EU highways (metric) **Requirements liability** in case of failures **Accuracy, fidelity etc. of Digital Twins** for multi stakeholders **Regulations for V2X solutions** to achieve common approach **PDI for monitoring** rather than functionality (ongoing assurance) How to resolve **ambiguous highway rules**, esp for liability	**Legal responsibilities** with OEMs/infrastructure/users **Infrastructure support for in-service monitoring** to support assurance	**JD**: Liability and trust

Name/Organisation	Gaps	Contributions	Comments from Torsten Geissler (TG) and Johanna Tzanidaki (JT)
Aalto University Claudio Roncoli	**Lack of feedback to vehicle design**. What is the assumption: is this activity putting vehicle and tech design **More interaction with validation**: can effect on transport system be useful **Standardisation of messages with/from vehicles**: how to deal with technologies that are continuously evolving		**JT**: Standardisation of data massages (our SRIA does not put standardisation in the scope but links us to it)
Uni Luxembourg Francesco Viti	**Lack of a common architecture and platform for integrated fleet and traffic management** to align goals of all actors **Involvement and explicit inclusion of end users** and their heterogeneity in the management loop	**Help to achieve seamless operations** and planning processes **Reduce gaps between personal mobility and collective mobility**	**JT**: Inclusion of end users should be in when we talk about 'heterogeneous actors'
Univ of Palermo Davide Lo Presti	**Scenario development is needed to drive and group technology** development related to CCAM infrastructure	They can lead a WP on that	

Name/Organisation	Gaps	Contributions	Comments from Torsten Geissler (TG) and Johanna Tzanidaki (JT)
Finnish Transport and Comms Agency (Traficom) Mikko Räsänen	We have long lists of **ODD attributes**, but do we really know **what are the requirements for them**? This requires input from OEMs to avoid unnecessary investments. Public Authorities will probably provide **digital rules of traffic**. It would be important to identify which rules should be available in the first phase **in order to extend ODDs**	Interested in the **joint Call with 2Zero and Cities Mission:** what is the relationship of the 'orchestration' Call to this. Is the 'orchestration' Call dealing more with roads? The overlapping issue should be identifies and clearly brought up where each issue belongs.	
Road and Bridge Research Institute (Poland) IBDiM Agnieszka Lukasiewicz		**Business and governance models Protection of VRUs Integration with the mobility system Mobility eco-system-the process**, mobility friends Multimodality/sharing mobility/micromobility	

Name/Organisation	Gaps	Contributions	Comments from Torsten Geissler (TG) and Johanna Tzanidaki (JT)
ETRA **Maria Tomas**	**Definition of a set of data** to be shared between the V and the infrastructure (both ways) The development of new services (both for increase of ODDs and to help cities to accomplish zero accident, green Deal objectives-EU targets) should rely **on the optimisation and use of the data available** (CAN BUS, TM Centre, PT operators) **and not deploying extra devices in cities**		
Polytechnic of Bari **Maria Pia Fanti**	**Integration of CCAM systems and services for transport of people and goods** Necessity of **design services, rules and governance models** Needs of real implementation in traffic (**difficult in motorway**)		
TNO **Jochem Brouwer**	**The data sharing V to ecosystem** is quite implicit **Micro mobility** is also quite implicit	SHOW (among others) worked on demand forecasting of AVs in PT V2I in NL **Orchestration** for better/improved traffic flow	

Name/Organisation	Gaps	Contributions	Comments from Torsten Geissler (TG) and Johanna Tzanidaki (JT)
ITS Norway **Ragnhild Wahl**	It should be emphasised the **need of requirements for data exchange and for standardised data messages** **Data trust** in important		
CONTRIBUTIONS COMING FROM DISCUSSIONS IN CLUSTER 6	↗ Organisational aspects – road authorities – what are their future roles and which skills will be needed? ↗ Responsibilities for maintenance and operation of digital infrastructure and enablers for enhanced ODDs? ↗ Digital infrastructure will also require physical infrastructure – ensure the availability, that the space for the physical infra, powering of this infra, owners, the maintenance, operations are available and clearly identified. Standardised thresholds with sufficient quality when using vehicles as "sensors" or providers of e.g. road weather status. Avoid that one vehicle says "this spot is icy" while another one says "this spot is not icy". "there are lots of speculations in the area of needs for digital infrastructure" – but less facts!	↗ CEDR project on innovative and future proof road asset monitoring systems ↗ National project (SE) Digital Winter Report: Infrastructure for cars with automated functions: knowledge base on the need for necessary adaptation (In Swedish)	

Cluster 5 – Key Enabling Technologies

Name & Organisation	Identified Gaps	Contributions
Kjersti Midttun **Norwegian Public Road Administration** **Kjersti.midttun@vegvesen.no**	Crossborder issues	
Alan Walker **Techworks/ AESIN/ Syselek** **Alan.walker@syselek.com**	1- Clear requirements from applic. To supply chain -> HW/SW & enabling tech's, which define/ quantify needs on cost, resilience, security, trustworthiness, etc. i.e. all attributes 2- Alignment of roadmaps for applications & technologies, which account for assurance / certification, rather than possibilities, with market pull.	1- Attributes definitions & trade off approaches for defining requirements on enabling technologies 2- Metrics, assurance at homologation and in-service therefore enabling technologies (especially M.L.) for in-service monitoring 3- Understanding required or expected maturity of key technologies to reach product (high TRL) and time frames 4- White papers to catalyse alignment across stakeholders
Stefan Van Baelen **INEC** **Stefan.vanbaelen@imec.be**		Collaboration between partnerships, align SRIAs with other partnerships e.g. ADRA/BOVA, KDT/Chips JU (INSIDE, EPOSS, AENEAS) cross-fertilisation CCAM Important KETs: connectivity, edge-AI, sensing/vision, reliability, security, explainability Projects: AI4DI, AI4CSM, STROAIGE, TEMPO, BEYONDS, 5G-CARMEN, 5G-BLUEPRINT, 5G-MOBIX, CEF-CONCORDA, ECSEL-AUTODRIVE, VITAL-5G, PRYSTINE
Magnus Granstrom **Chalmers** **Magnus.granstrom@chalmers.se**	Cybersecurity – which are the specific CCAM issues to address that are not already done elsewhere	Some relevant activities within the DRIVE Sweden programme: AI Driven Mobility – with focus groups on e.g. logistics and traffic safety

Name & Organisation	Identified Gaps	Contributions
Gunny Dhadyalla **Techworks Hub** **Gunny.dhadyalla@techworks.org.uk**	Scenario databases – balance between open databases and commercially available databases. -> The business case given how expensive innovation is. Especially edge-cases.	UK – CCAV project called ResiCAV – resilient CAV for cybersecurity
Nere Garmendia **NAITEC** **ngarmendia@naitec.es**	↗ Anonymize the users while taking the data ↗ Use of different devices for different vehicles and types of data ↗ Functional safety	NAITEC and Pamplona council are working on a PILOT URBAN CIRCUIT, where sensors will be installed at infrastructure & vehicles and data will be transmitted, collected and analysed. KET will be: sensing, control, communication, cybersecurity, data analytics, AI, …
Etienne Arbogast **Covea Assurance** **Etienne.arbogast@covea.fr**	Maybe a topic on on-board computational power? Explainability: how and what can be exposed to the user, paying attention not to saturate him. IA explainability is a field of research at the *French Institute des Actuaires* --> maybe a cross-presentation? +how to determine after an accident who/what was in responsibility?	
Tom Alkim **MAP traffic management** **Tom.alkim@maptm.nl**	↗ From distributed awareness to expected and accepted driving behaviour responses to that awareness ↗ Find balance between necessary level of detail for contextual awareness/ elements for edge case/ scenario description and associated costs → from big data to smart data	

Name & Organisation	Identified Gaps	Contributions
Mehrdad Dianati **University of Warwick + WMG** **m.dianati@warwick.ac.uk**	↗ Connectivity technologies, Edge computing ↗ Sensors ↗ Positioning ↗ Be more specific on AI: perhaps ML/DL would be more specific	↗ Cooperative perception ↗ Cooperative tactical decision making ↗ V2X, 5G, 6G systems ↗ Resilient system design for CCAM systems ↗ Past and ongoing projects: L3Pilot, Hi-Drive, DriveC2X, AutopleX, CARMA…
Franz Schober **Yunex Traffic** **Schober.franz@yunextraffic.com**	↗ Edrive/EforPS, SPAT prediction, functional safety ↗ Would be good if it is not mandatory to "demonstrate" the project "on road". It's hasD to demonstrate a theoretical study 😊	
Kevin Tammearu **Bercman Technologies** **Kevin.tammearu@bercman.com**	There should be more emphasis on RSI supported AI use cases. RSI is mostly under the road operator and can act as a tool of governance. These AI use cases can already support the existing traffic environment and support adopting mixed traffic through cooperative perception etc.	
Dimos Gatidis **FEV** **gatidis@fev.com**	No major gaps, just perhaps: software defined vehicles could get more awareness/consideration. Incl. possible component related issues. And: we must be aligned concerning the definition of terms such as AI, Big Data, connectivity, HMI and even cybersecurity (measures). "Vehicles become computer/rolling devices"	

Name & Organisation	Identified Gaps	Contributions
Jochem Brouwer **TNO** Jochem.brouwer@TNO.nl	Positioning and reliable communication	Functional safety might currently be too implicit (especially in communication – AI) 5GMOBX – CPM SAFEUP/DITM
Javier Ibanez Guzman **Renault** Javier.ibanez-guzman@renault.com	↗ DI tools for validation ↗ How do we trust ↗ Sharing information through CCAM – control tower	
Knut Evensen **Norwegian Public Roads Adm.** Knut.evensen@mobility.no	The uncoordinated introduction of L2 and L3 functions represent a safety hazard, since phone is no education of drivers but great variance from car brand, year model, equipment configuration etc. This is partly regulatory, but will also require RIA to be solved. And standards!	Gaps & contributions: Automation needs interaction and guidance from authorities. This is a regulatory need, and is also the difference between autonomous and automated driving. NPRA has active projects studying and developing METR, electronic traffic regulations and related cybersecurity, and we offer this to CCAM (see overleaf)

Arrate Alonso Gomez
Mondragon Unibertsitatea
aalonso@mondragon.edu
	↗ Vehicular connectivity:
	  ➔ multi-radio technologies/ hybrid platforms
	  ➔ reliability in connectivity
	↗ Edge sensing /processing as an enabler of continuity at the ODD domains (perspective: infrastructure-assisted driving)
	↗ Collective perception enablers (Day2 services) -> collective perception messages (CPM) as baseline
		We are working on multi-radio platforms for ITS within the InSectt project (ECSEL-JU), V2X solutions + cellular

Name & Organisation	Identified Gaps	Contributions
Walter Ukovich **Polytechnic Univ. of Bari** ukovich@gmail.com	Are autonomous vehicles expected to cover <u>all</u> mobility requirements in the long term? That would be an easier situation than the mixed (autonomous <u>and</u> human-driven vehicles)	

Cluster 6 – Societal aspects and user needs

Name & Organisation	Identified Gaps	Contributions
Manuel Picardi **EFA** **Manuel.picardi@efa-eu.com**	People must accept a new society. Most of them need to be trained. How can we convince people to be trained for a new life? Is this the real life that people want? Do the drivers really want to be driven by cars?	Which kind of training curricula should we design for citizens? And for the next generation? How can we deliver CCAM benefits and concepts t the citizens?
David Laoide-Kemp **Transport Infrastructure Ireland** **David.laoide-kemp@tii.ie**		How does societal readiness reflect sustainability agenda where we are encouraged to use public – not private – transport?
Agnieszka Lukasiewicz **Road and Bridge Research Institute (IBDIM)** **alukas@ibdim.edu.pl**	↗ Safety – vulnerable road users ↗ Elderly people, accessibility ↗ Models of mobility e.g. sharing mobility ↗ Trends in travel behaviour MaaS – new generation ↗ Infrastructure justice ↗ SDGs relation/link with CCAM ↗ Stakeholders involved on each level of implementation	↗ How to measure stages ↗ CBA including new modes of transport ↗ Transport systems – inclusion of CCAM – environment ↗ Demographic trends ↗ Cultural diversity ↗ Influence on jobs – people are afraid of new technologies (e.g. drivers)
Francesco Viti **Uni Luxembourg** **Francesco.Viti@uni.lu**	↗ Mobility patterns are fragmented and can be better consolidated ↗ Many movements are unnecessary or they have the "wrong" direction (e.g. going shopping instead of having an efficient delivery) 1- Better definition of willingness to use (or better engage/adopt) CCAM and in relation to end users in a broader term (citizens, control centers, fleet managers) 2- Clearer definition of KPIs, in light of the above point, by stakeholders	↗ Transfer mature concepts in logistics to mobility such as consolidating trips ↗ Increase "quality of mobility" 1) Quantify the impact of CCAM for all actors involved, e.g. economical for commercial services, environmental for public authorities, societal for citizens 2) Contribute to align expectations and increase willingness to use CCAM in all traffic conditions

Name & Organisation	Identified Gaps	Contributions
Jaap Vreeswijk **MAPtm** Jaap.vreeswijk@maptm.nl	Continuity of assessing social aspects; not just a preparation of deployment, but as integral part of a functioning ecosystem, as needs change because attitudes change, situations change etc. It comes down to continuously monitoring sentiment and match CCAM supply with demand. The CCAM solutions/services should be able to catch this.	
Marcel Meeuwissen **TNO** Marcel.meeuwissen@TNO.nl	Start reasoning from the societal needs for a mobility system and define what this means for needed CCAM	↗ Mobility modelling from society → traffic → vehicle & user level and the other way around ↗ Scenario-based impact assessment on a variation of aspects (safety, energy, equality, flow)
Million Weldu **NPRA** Million.kiros.weldu@vegvesen.no	How do we measure "impact" – is it measured on the basis of current situation – or "future society" I feel that we need to define "what kind of society do we want to create?". Emerging technologies have demonstrated that we do not have control of their impacts or effects.	
Sven Jansen **TNO** Sven.jansen@tno.nl	Method to validate that impact will be achieved. ➔ Slow transition process. How to try out new solutions within project period for user adoption ➔ Identify restrictions to take away in order to achieve impact	
Lucia Sanz **Altran (Capgemini Engineering)** Lucia.sanz-pardo@capgemini.com	Common understanding of what we consider regarding diversity, going beyond the "typical" gender, age, disability… considering the current societal changes. Maybe a "multi-label" diversity (consider more than one aspect of diversity) could improve the impact of solutions. Automotive OEMs are looking to know more the profile of their clients to adapt their products and improve acceptance (and sales)	

Name & Organisation	Identified Gaps	Contributions
Eckard Steiger **Bosch** **Eckard.steiger@de.bosch.com**	↗ How to cope with "unreasonable" user needs? (Not contributing to CCAM targets but creating impediments). Example: scooters vs. safety targets ↗ Coping with "external" trends not known as "user needs" now but being created e.g. e-scoter shared services. How to be considered in Cluster 6? ↗ SRL: missing the word "market", missing global perspective (trends typically come not from EU but…), SRL only measuring not controlling?	
Cédric de Cauwer **Vrije Universiteit Brussel** Cedric.de.cauwer@vub.com	Look at acceptance (user) of the (integrated transport) systems as a whole (rather than a technology on its own) The importance of data (gathering) in this regard is also important Identification and understanding of behavioural dynamics which are the basics for the assumptions in impact methodologies (e.g. number of cars, cr ownership, modal shift, number of kilometers driven) Are they validated? (link to Cluster 3 Validation and Cluster 1 Demo)	

Name & Organisation	Identified Gaps	Contributions
Giulia Renz **ICOOR - Unimore** Giulia.renz@icoor.it	↗ Try to "make rational" not rational needs/fears/concerns ↗ Common methodology to evaluate SRL ↗ Missing: increase attention to "marketing" and "communication" aspects (some communication strategies are very "old")	SINFONICA project ↗ Starts in September 2022 ↗ Users' needs ↗ Methodology to engage and to collect info ↗ Co-creation based ↗ Study of the diversity/ vulnerable users Additional ideas: - Organize big meetings with on-going (or just finished) projects related to societal needs - Organize a "CCAM Tour": meetings, workshops, conference through Europe to talk with cities/ People/ Associations/ Stakeholders
Hélène Wiedemann **Renault** Helene.wiedemann@renault.com	↗ SRL: how to adapt it to territories. All the territories have the same needs or not? There is a need to measure externalities AND benefits using similar units (monetization?) to be able to have a global approach ↗ Other gaps: how to link social benefits of costs of CCAM to SUMPs/SULPs? and maybe Sustainable Rural Mobility Plans, with a methodology that is shared by all stakeholders, because in fine CCAM will need to be integrated in Sustainable Mobility Plans, we need to help territories to choose the best way to do that → link with Cities Mission and Cluster 1?	

Name & Organisation	Identified Gaps	Contributions
Davide Lo Presti **University of Palermo** **Davide.lopresti@unipa.it**	Whatever scenarios of mobility is developed for CCAM, how do you actually assess their sustainability? Sustainability assessment techniques (sustainable rating systems, or LCA, LCC, S-LCA) can be of support. I will be glad to be involved in activities looking at sustainability assessment of CCAM enabled mobility scenario.	
Josephine Darlington **DRIVE Sweden** **Josephine.darlington@lindholmen.se**	Missing the focus of goods both in urban areas and non-urban, we need to take in that 50% of our consumption will be done online by 2035. Deliveries make it possible to reduce the need for the personal car and can increase efficiency in the city. We might not always need to travel. It can make services and goods available for all, both with disabilities and reduce the gender imbalance for the unpaid housework done by women.	