CoEXist

Preparing cities for the transition to vehicle automation

Attendee engagement report

Polls and Q&A

www.h2020-coexist.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 723201-2

Wednesday 25 March 2020

CET (UTC+01:00)

Moderator: *Siegfried Rupprecht, Rupprecht Consult*

13:45 Registration and technical support

14:00 **Welcome**, Siegfried Rupprecht, *Rupprecht Consult* & INEA (tbc)

Introduction to CoEXist, *Daniel Franco*, *Rupprecht Consult*

CoEXist tools

Automation-ready transport modelling and infrastructure assessment

14:10 **Overview of the CoEXist impact assessment approach and automation-ready transport (infrastructure) assessment tool**, *Johan Olstam, VTI*

14:25 Polls - Q&A

14:30 **Automation-ready modelling tools: microscopic traffic flow simulation**, *Charlotte Fléchon, PTV Group*

14:45 Polls - Q&A

14:50 **Automation-ready modelling tools: macroscopic travel demand simulation**, *Markus Friedrich, University of Stuttgart*

15:05 Polls - Q&A

15.10 **Toward the Development of Analysis, Modelling, and Simulation (AMS) Tools for Connected and Automated Vehicles (CAVs),**
Rachel James, USDOT Federal Highway Administration (FHWA)

15:25 Polls - Q&A

15:30 ***Break***

CoEXist impact assessment findings

Potential impact of vehicle automation in four cities, across eight scenarios:

15:45 **Helmond (NL): (i) multimodal signalised intersection and (ii) highway-urban road transition**, *Frank van den Bosch, city of Helmond*

16:00 Polls - Q&A

16:05 **Gothenburg (SE): (i) shared space; (ii) accessibility during long-term roadworks**, *Iman Pereira & Chengxi Liu, VTI*

16:20 Polls - Q&A

16:25 **Milton Keynes (UK): (i) drop off and waiting for passengers; (ii) priority at roundabouts**, *John Miles, University of Cambridge*

16:40 Polls - Q&A

16:45 **Stuttgart (DE): (i) network level travel time & mode choice; (ii) ridesharing**, *Jörg Sonnleitner, University of Stuttgart*

17:00 Polls – Q&A

17:05 **Lessons learnt & conclusions,** *Wolfgang Backhaus, Rupprecht Consult*

17:15 End of the session

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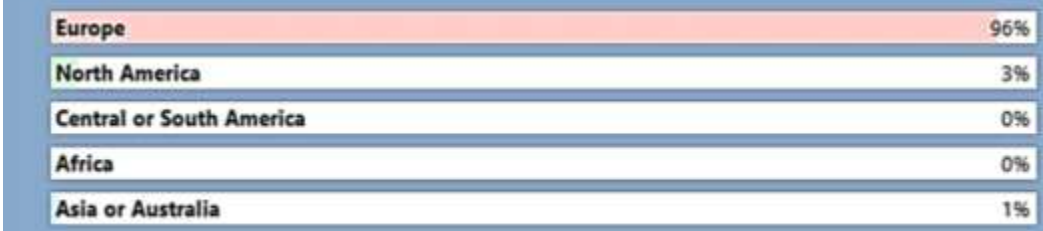
Results of the polls conducted

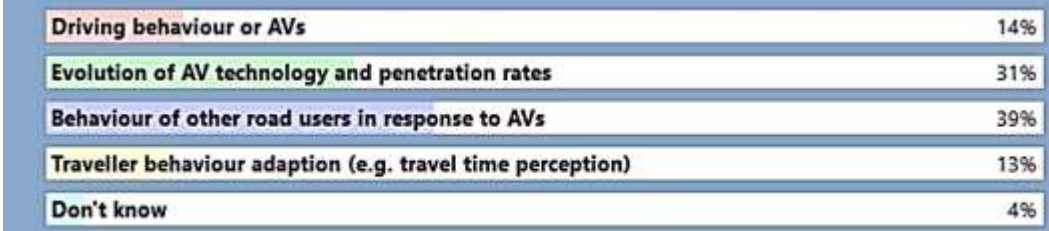
1 - What part of the world are you joining us from?

Umfrage-Ergebnisse (eine Antwort erforderlich):



3 - Which uncertainty factor, do you think, is most uncertain?

Umfrage-Ergebnisse (eine Antwort erforderlich):



4 - Which mix of Basic, Intermediate and Advanced AVs, do you think, is most probable in the established stage?

Umfrage-Ergebnisse (eine Antwort erforderlich):

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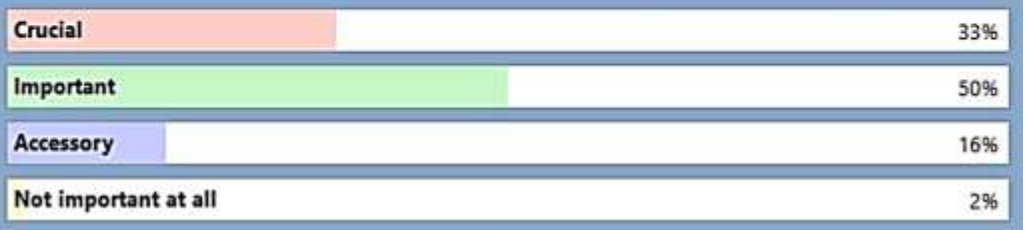
5 - How important, do you think, will be the role of modelling tools to prepare the transition phase?

Umfrage-Ergebnisse (eine Antwort erforderlich):

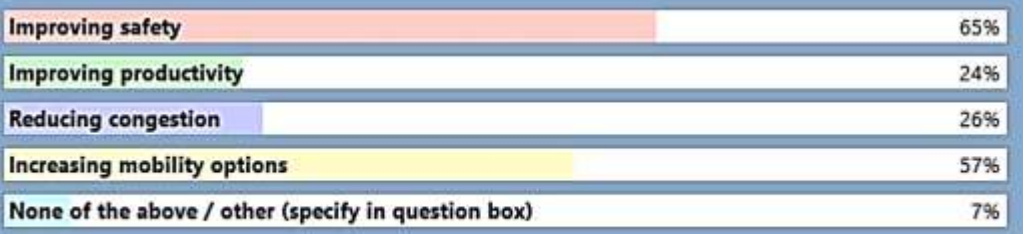


7 - How will AVs affect travel demand by 2040?

Umfrage-Ergebnisse (mehrere Antworten möglich):

9 - What do you think are the primary reasons for developing CAD (select all that apply)?

Umfrage-Ergebnisse (mehrere Antworten möglich):



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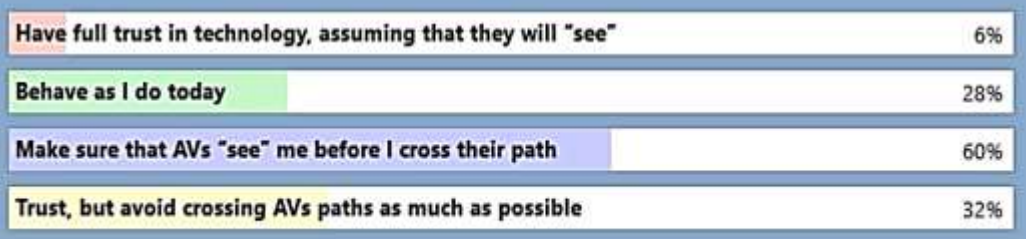
10 - When do you expect a noticeable effect from AVs on the road (in your city)?

Umfrage-Ergebnisse (eine Antwort erforderlich):

11 - How would you, as a pedestrian, act in the vicinity of automated minibuses in a shared space area? I would:

Umfrage-Ergebnisse (mehrere Antworten möglich):



12 - What level of 'cautious CAV' penetration might be required for the collective effect on macroscopic traffic flows?

Umfrage-Ergebnisse (eine Antwort erforderlich):

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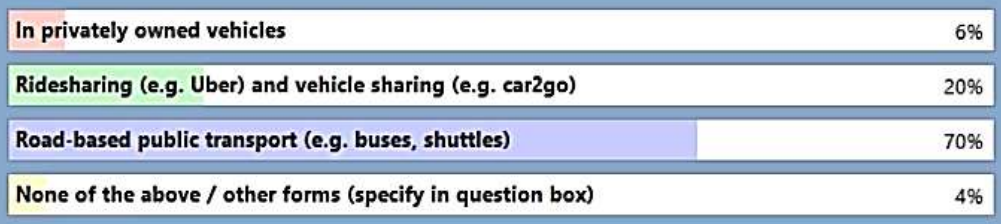
13 - What level of 'all knowing CAV' penetration might be required for the collective effect on macroscopic traffic flows?

Umfrage-Ergebnisse (eine Antwort erforderlich):

14 - How and where should automation FIRST be deployed to rip the most benefits?

Umfrage-Ergebnisse (eine Antwort erforderlich):



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Questions and Answers

Question	Answer
Overview of impact assessment approach and automation-ready road infrastructure assessment tool	
Just to be clear, all the AV classes vehicles refer to Level 4 of SAE?	So, the approach is focusing on automated vehicles in which an automated driving system is responsible for the operation of the vehicle. This is for sure the case in level 4 but could also happen in level 3. At level 3 the driver is formally responsible so in that sense the assumptions in the driving logics that every vehicle follows the road code and speed limit. But we think that the responsibility for example wrt speed limit compliance still would apply at level 3. In addition, the characterization of the CAVs behaviour follows a different approach than focusing on SAE levels for the impact assessment. CoEXist does not focus on the technologies that allow SAE 4 level, but assumes their functionality and defines behaviours from an operational perspective This question was also replied to in the webinar (00:36).
If I understand correctly, this part of work was limited to looking at automating private cars?	The modelling and assessment approaches do not really address the question on whether it is private or public. It is a single set of driving logic and then it depends on the use case. Some use cases consider buses or shared-AV fleets, in studying potential changes in travel demand, for example. So, with the developed tools and methodologies, you can evaluate different types of AVs and service models. This question was also replied to in the webinar (00:36).
Automation-ready microscopic traffic flow modelling	
Are all the introduced features of VISSIM, available in the commercial version of the software?	Yes, some were available already in Vissim 11, and the last ones, like platooning for example, are available since Vissim 2020 (released in October 2019).
Are the vehicles with the driving logics in PTV Vissim are AV's or are CAV's?	They can be both depending on how you set the parameters.
Are there any publications or scientific report from PTV side regarding how the most recent car-following parameters are calibrated and validated by using the real-world driving data?	Yes, please see *D2.6 Technical Report on data collection and validation process.* Available on https://www.h2020-coexist.eu/resources/ -> CoEXist publications

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As per my understanding, only car following variables were collected during real-life data. Does the lateral control and lane change variables in PTV Vissim of the driving logics are validated and can be used as recommended variables?	Yes, that's correct. We will continue improving our software for the simulation of automated cars outside of CoEXist and will improve this further. stay tuned). This question was also replied to in the webinar (00:55)
Does the co-simulation environment also include sensors?	Yes, in the sense that PreScan can model sensors. If you have specific needs, then I would advise to contact our partner TASS International.
For a co-simulation approach, is Vissim 2020 capable to adapt for different driving directions?	Externally controlled vehicle can move freely through the network. Does it answer your question?
In the microsimulation, how does the throughput results changed with each of the parameters you identified?	Have a look at the different deliverables, mostly D2.5, D2.6 & D2.7 (for D2.7 the end of the document: part 6.4). You can find them on the CoEXist Website: https://www.h2020-coexist.eu/resources/ -> CoEXist publications
What are the limitations of platooning possibility in Vissim 2020, in terms of length of the platoon for the HGVs?	99999 vehicles
Automation-ready macroscopic travel demand modelling	
Can this research [on automation-ready travel demand modelling] be used for other applications than PTV Visum?	The modelling approaches in general can be used for any macroscopic modelling software. However, the scripts we provide use the Visum data model and the COM interface. But they can be adapted to other data models.
Did you not distinguish at this point whether the vehicles would be private/shared/public and their capacity (individual/"van"/minibus/bus)?	Use case 8 will take a look into impacts in travel demand when introducing shared-AV fleets. This will be our final use case today. Other than that, use cases look into the behaviour of AVs without a defined business model. But different types are considered in some use cases (cars, trucks, buses)
Did you consider multimodality (FM/LM + transit)?	You can integrate FM/LM services in the public transport assignment model. But this is not a specific feature of AV. In the uses cases we distinguished integrated ridesharing (RS+), where ridesharing is part of Public transport. And non-integrated ridesharing (RS-)
Does the macroscopic modelling include AVs used for public transport?	The algorithms for trip pooling and vehicle scheduling can be used for manned and unmanned vehicles. This does not influence the vehicle volume. For traffic flow, we assume that they behave like cars.
How was the assumption of 30% reduction in perceived time selected?	This question was replied to in the webinar (01:15)

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What do you mean "better" cars?	Better cars are cars that are better than the cars we have today. Every new generation of cars provides more advanced driver assistance systems, making the drive more comfortable. If cars become more comfortable, we are likely to use them more. This question was also replied to in the webinar (01:14)
Why would people choose to do more car sharing with and AV than now with manual driven cars?	The very moment a carsharing vehicle can be moved without a driver, it may pick travellers up at their origin. It would then be similar to a taxi without driver, but probably much cheaper. So, travellers may shift from public transport to car.
Impact assessment findings: Use case implementation	
For the use cases, was there any lane change behaviour incorporated? If so, was it done using recommended driving logic lane change PTV Vissim parameters?	PTV has given recommendations (see D2.5 part 3.3.2 available on the CoEXist website: https://www.h2020-coexist.eu/resources). Details on the use cases technical implementation can be found in D4.2
General question on all the different demonstrations: Have you made any estimation on how well these results are generalisable (apply also to other locations in Europe)?	This question was replied to in the webinar (02:27)
Gothenburg – Use case 1: Has the model of pedestrian behaviour in shared space been calibrated or validated with real-world data?	For the Gothenburg case we had video-based measurements from the site. We also had data from earlier projects on pedestrian behaviour for pedestrian-pedestrian interaction. We e.g. extracted desired speed distributions from the video data.
Gothenburg - Use case 1: If people are already walking, is it really necessary to introduce a LM service for such a small (walkable) distance and providing such poor service? Where in your city would that make more sense (e.g. somewhere car's modal share is >60%)?	First a clarification, the last mile service is not intended to only run in the simulated shared space but a last mile service operating in a city centre might need to pass through shared space areas. We investigated how the travel time and delay when passing through a shared space would be affected. This means that although large increase in travel time (due to keeping legal speed limit of 8 km/h in a shared space) and delays due to polite always yielding to pedestrians the travel time and delay for a complete last mile service drive depend on how travel time and delay is affected on the whole route. But the question is of course relevant and interesting when is it really a good alternative to choose a last mile service and for who.
Gothenburg – Use case 1:	Agree it would not make sense if the last mile service only operated in the small area simulated

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If people are already walking, is it really necessary to introduce a LM service for such a small (walkable) distance and providing such poor service? Where in your city would that make more sense (e.g. somewhere car's modal share is >60%)?	but that's not the intention. We only looked into how travel time and delay for automated minibuses would look like if they as a part of the journey traverse a shared space. The automated minibuses would mainly be interesting for people that for some reason cannot or do not want to walk. Since the travelling through the shared space is only one part of the journey the increased travel time and delay is probably not a problem.
Helmond – Use case 3: How are the driving behaviour of cars, bikes, trucks, pedestrians, calibrated in the simulation?	The behaviour of vehicles was calibrated through on-site data collection in Helmond's test track and with the co-simulation environment (PreScan & PTV Vissim). In Helmond, no direct interaction with bikes and pedestrians is considered, due to the type of road studied, and only were relevant at the signalised intersections.
Helmond – Use case 3: With the results of automation on traffic flow, what does the city of Helmond intend to do to reduce car use? Isn't reducing car use more effective than expecting "prevalent" AVs?	This question was replied to in the webinar (02:06)
Milton Keynes – Use case 5: in measure 1, does the CAV that "takes off" goes to pick up other passengers or remains idle? Have you considered empty cruise impact for pick & drop scenario?	This question was replied to in the webinar (02:50)
Stuttgart - Use case 8: How do you include car sharing and ride sharing in your mode choice model?	This question was replied to in the webinar (03:13)
Stuttgart – Use case 8: Have you taken into account cost of owning and operating CAVs and fuel supply and cost due to more VMT?	Costs through more VMT are considered, including fuel etc. But the car ownership has not been modelled in detail with the fix costs of buying an CAV.
Stuttgart - Use case 8: Are these modal shifts (decrease in PT, increase in car use) something the city wants to target or avoid?	Please see Part 2 of the CoEXist Conference, to learn about Stuttgart's objectives and strategy for CCAM.
Next steps after the project is finished	After the project, CoEXist partners will continue their research and the development of the tools presented. In April, we will publish our Exploitation and Innovation Plan with further details on the road ahead and will be available on our website. From Rupprecht Consult, we are looking forward to providing more detailed guidance on how to address road-vehicle automation in SUMP processes.

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USDOT FHWA Projects: Toward the Development of Analysis, Modelling, and Simulation (AMS) Tools for Connected and Automated Vehicles (CAVs)	
Which microscopic traffic simulation tool and driver model are used for the two FHWA projects?	Thank you for the question. The SR-99 case study used Aimsun. For the SR-99 case study, we used the NGSIM oversaturated flow human-driver model and ACC/CACC models developed by Milanes and Shladover (2014) using field test datasets. The lane changing behaviours of CACC vehicles and the algorithms for implementing the VAD and ML strategies are described in Liu, Kan, Shladover, Lu, and Ferlis (2018). The I-66 case study was conducted using VISSIM. The human drivers in this model were modelled by VISSIM and calibrated using speed and volume data collected by six remote traffic monitoring system trailers along the major mainline segments. The ACC/CACC model was the one developed by Milanes and Shladover (2014). The speed harmonization algorithm is published in a 2016 FHWA Report (Speed Harmonization Fundamental Research I, Final Report). The cooperative merge algorithm was developed as part of this project and will be detailed in the forthcoming report.
There is much research on (C)ACC behaviour and impact by PATH. Did you compare your results with theirs? And what are the main differences / similarities?	It was TASS and PTV conducting the field tests in Helmond and the analysis and of the results and the implementation in Vissim. The results have been presented within the twinning meetings and discussed but not formally compared or documented.

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Thursday 26 March 2020

Workshop: What next for cities and CAVs?

moderated by Siegfried Rupprecht, Rupprecht Consult

14:00 ***Welcome,*** *Siegfried Rupprecht*

14:05 **Automation-ready framework for city authorities**,
Wolfgang Backhaus, Rupprecht Consult

14:20 **CoEXist – Roadmap towards automation-ready cities**
Brian Matthews, Milton Keynes city council
Susanne Scherz, city of Stuttgart
Mikael Ivari, city of Gothenburg
Frank van den Bosch, city of Helmond

15 min per speaker (including 3min Q&A)

15:20 *Poll & self-assessment of automation-readiness*

15:30 **Interactive group discussion**
Key issues for cities, including change and expectations management, future proofing sustainable mobility policy, future proofing infrastructure investment and citizens engagement citizens.

15:50 **Lessons learnt and conclusions,** *Wolfgang Backhaus, Rupprecht Consult*

16:00 End of the session

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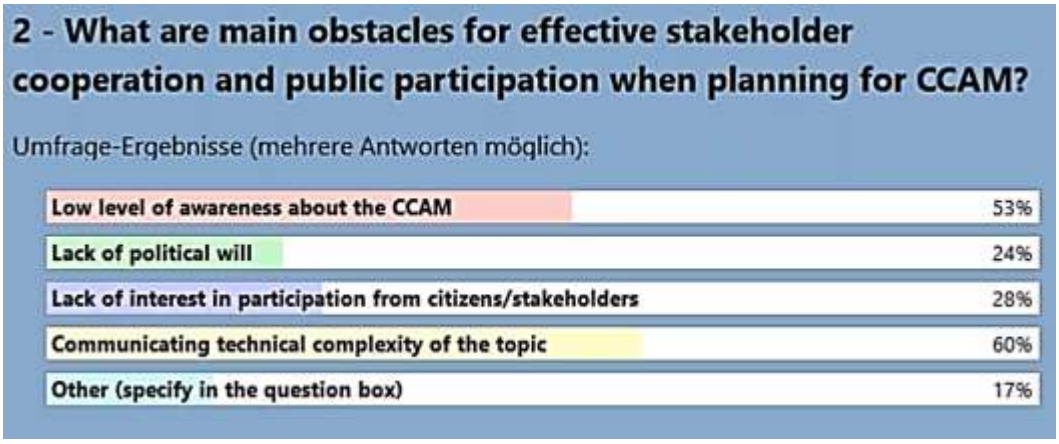
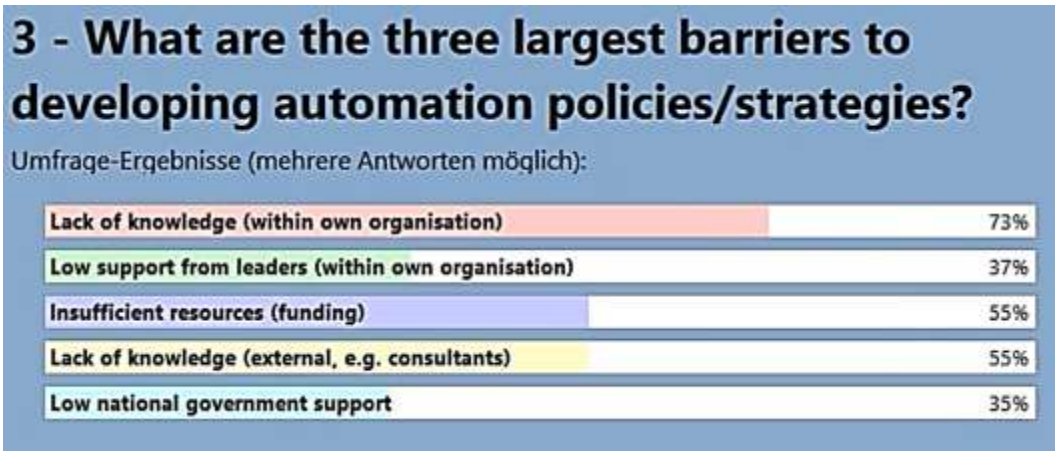
Results of the polls conducted





See the results from the Interactive workshop (in Mentimeter) at: https://www.h2020-coexist.eu/wp-content/uploads/2020/04/CoEXist-Final-Conference_What-is-next-for-Cities-and-CAVs_-Interactive-Session.pdf

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Questions and Answers

Question	Answer
Are there already thoughts about updating the automation ready frame-work after the end of the CoEXist project. It would be very valuable to have this as a kind of live document that could be updated following the rapid developments and lessons learnt from cities in the next coming years? Is this something Rupprecht could exploit maybe?	Indeed, the framework is currently undergoing further development and a second version will be submitted by end of the project, next month. We are also looking forward to continuing the development of this product after the project and extending the SUMP EU guidance document to provide more detailed support to cities and regions.
How do you see future with new legislations for present of CAVs and AVs to be enacted, taking into account that Vienna convention is still valid?	This is one of the big uncertainties in the field, as not only depends on the level of automation reached by a vehicle, but its driving behaviour and type of service provided. The Vienna convention, already more than 50 years old, would need to be updated as you well highlight. Not only the question of 'who is in control and liable' needs addressing, but also how to regulate the (C)AVs behaviour and where it is allowed to drive.
Helmond: Besides ISA and private car-oriented technologies, what's your goal in terms of modal share of PUBLIC/SHARED CAVs in the future?	This question was replied to in the webinar (01:25)
Helmond: Do you see special problems in the interaction with cycle traffic?	This question was replied to in the webinar (01:27)
Milton Keynes: "More transit" is not part of your objectives?	This question was replied to in the webinar (00:34)
Milton Keynes: Yesterday's simulation results showed a degradation of all mobility indicators in the short/medium term. How do you plan to adjust the introduction of CAVs WRT those results?	This question was replied to in the webinar (00:36)
Stuttgart: Which is the governance on the suburban areas of the city (where cars come from)? Do you have any means to act in those areas?	This question was replied to in the webinar (00:54)

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Stuttgart: Is this Automation-ready Action Plan Stuttgart already available?	It is still under development, and should soon be publicly available.
Gothenburg: Which is the modal share of car/PT/active modes in the city centre? And what's your goal in terms of modal share of CAVs in the future (private/public/shared CAVs)	This question was replied to in the webinar (01:10)
Gothenburg: How do you plan to affect the modal share from people coming from the suburbs?	One action that is ongoing is the construction of a new train tunnel under the central parts of the city that will allow for more attractive commuting by train.

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