Aalto University
School of Engineering

WISE-ACT – WG5
Scenario development

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Key tasks

- T12: Develop and evaluate a number of scenarios of AVs deployment throughout Europe
- T13: Compare the results of simulation analyses across different localities
- T14: Develop a set of criteria and indicators which can inform policy makers about deployment of AV in a certain locality

Our report

Autonomous and Connected Transport scenarios evaluation based on simulation analysis

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Scenario development

- Simulation results are highly dependent on the scenario that is defined beforehand
- In this context, a scenario is defined by a set of parameters that affect simulation performances
- Different tools require different parameters
- Requiring assumptions on the ACT implementation
- Defining appropriate scenarios for each research question is crucial

Example of extreme scenarios

1 Full centralised automation and connectivity
Requires high investment in infra-structure. Prior to this, technolog-ical advancement is a prerequisite. The law has fully considered the exchange of data and communi-cation. The automated vehicles are to drive relying on a central transmitter. Their sensors will have a secondary function. Increasingly separation of modes in urban areas.

2 Overnight technological shift
Vehicles will have to make do with the infrastructure in place. Technology will be expensive, so TNCs will offer AV services leading to increased traffic in cities.

3 Centralised last-mile system
There will be a centralised AV system set up, focusing mainly on serving the already-in-place mass transit system. AVs pick-up and drop-off mass transit users requiring to be driven the first/ last mile.

4 Highway automation, but urban exile
Automated vehicles will be in full capacity on highways where they can be driven without interrup-tion of less predictable traffic participants. Non-automated vehicles will be transitioned from highways. Automated vehicles will be transitioned out of cities, where urban residents will be in the focal point.

City locations

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Simulation models and tools

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- Heterogeneities in scenarios and research questions require different simulation tools. Two main approaches:
  - Microscopic (traffic) simulations
  - Agent-based demand modelling

- Each simulation analysis differ by various features, including software, parameters settings, vehicle behavioural models, vehicle composition, study area, …

- Need for establishing standards for building, calibrating, and validating traffic models of CAVs

- Feel free to look at the report for detailed results…

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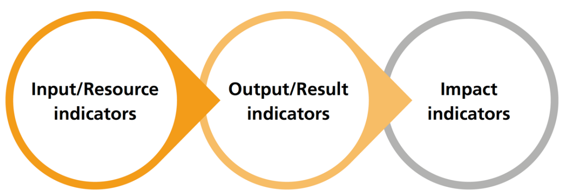
Criteria and indicators for ACT deployment

- Essential element of assessments and ultimate goal of scenarios and simulations
- Our framework:



Type of indicators	Policy goal/objective/target	Indicators	Direction
Input/Resource indicators	– Measure input variable and simulation settings parameters – Minimise input – Minimise cost	Fleet size	Increase/decrease
		Modal share	Increase/decrease
		Peak hour demand	Decrease
		Penetration rates	Increase
		Service area	Increase
		Travel cost	Decrease
		Travel time	Decrease
		Vehicle capacity	Increase
		Vehicle recharge duration	Decrease
		Vehicle range	Increase
		Vehicle relocation time	Decrease
Output/Result indicators	– Measure the immediate (dis-) advantage of the project – Optimise the output – Maximise the utility	Dead kilometre travel	Decrease
		Delay	Decrease
		Total distance travelled	Increase/decrease
		Value of travel time saving	Increase/decrease
		Waiting time	Decrease
Impact Indicators	– Measures the indirect medium to long-term consequences. – Maximise and ensure societal sustainability – Long-term mobility decisions – Residential attractiveness – Improve transport equity and accessibility	Road capacity	Increase
		Vehicle replacement rate	Increase

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Main takeaways

- Scenario developments and simulations are (the most effective) tools for quantitively assessing impacts of ACT in future mobility systems

- Undesirable effects can be anticipated by wisely developing scenarios and simulations, evaluating appropriate indicators

- Need of increasing visibility of our results to policy makers and broader community to promote the design of sustainable ACT

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Thank you!

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