

Global Dashboard User Manual

In this user manual, a complete walkthrough is given, through screenshots, to the final version of the Global Dashboard. The Global Dashboard is public and contains the final KPIs, calculated based on the data collected during the second pilot round. The same dataset was also used for the Impact Assessment studies. Overall, the project dashboard connects the test sites, use cases, and mapped KPIs, providing the broader picture and showing how the results from the pilots are linked to the project's impact assessment. The web-link to the Global Dashboard is provided here: <https://augmentedccam.com/ccamresources/augmented-ccam-dashboard>.

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AUGMENTED CCAM

Dashboard

KPI ANALYTICS (CHARTS)

Test Sites Filter by Category (Key Context): All



Use Ctrl + scroll to zoom map

Autoroute A10 near Paris, France

The section is a 32 km long dual carriageway highway in the COFROUTE highway network, from PR 0 at 'Les Ulis' city to PR 32 at 'Ablis' city. Multiple speed limits through the section (90, 110 and 130 km/h) and multiple lane configurations (2x2, 2x3, 2x4 lanes) are existent. Some main physical/infrastructure elements are PR 8 - Brita-sous-Forges; Special Access Bus Lane with pick-up/drop-off station on highway; PR R20 - Douaunay; Toll zones (entry and exit); PR 25 - Saint-Arnoult; Toll Barrier; PR 32 - Ablis. Toll zones (entry and exit) and multiple safe stop areas throughout the section.

VIEW DETAILS



Use Ctrl + scroll to zoom map

Satory Living Lab controlled environment, France

Closed test site in Satory (suburb of Paris) - Living Lab

VIEW DETAILS



Use Ctrl + scroll to zoom map

Open Road ZEHNS on Highway A63, France

Closed test site in Satory (suburb of Paris) - Living Lab. The section is a real traffic highway of 2x2S kms and 2x3 lanes, front-entry 18 to entry 16 (3 entrances included) including a toll gate on the main section.

VIEW DETAILS



Use Ctrl + scroll to zoom map

Biķernieki racetrack, Latvia

A closed test site at the Biķernieki racing track in Riga. This site enabled innovative solution development for various stakeholders - startups, public sector companies, academia, and more. The test site simulated cross-border 5G connectivity, using Latvia's LMT and Estonia's Telia 5G networks to imitate a fully functioning international connectivity needed to test cross-border mobility solutions. It was the first-ever simulation space of such kind in Europe.

VIEW DETAILS



Use Ctrl + scroll to zoom map

Digital Model (Rome/Athens), Italy

Digital Model representing the road network of an area both in Rome and Athens. The model is utilized with real traffic data and spot-based availability integration.

VIEW DETAILS



Use Ctrl + scroll to zoom map

EMT depot semicontrolled environment & surroundings - Carabanchel, Spain

Inside and surroundings of EMT bus depot in Carabanchel. This was a semi-controlled area in which the CAVs were able to interact with other non-automated vehicles (buses) and VRUs, with several pedestrian crossings inside the depot. The EMT bus depot counted on around 400 buses, right in the middle of it is the office building and the garage.

VIEW DETAILS



Use Ctrl + scroll to zoom map

Open Traffic Urban area - Villaverde, Spain

Madrid open-traffic area. This test site consisted of a meshed path of a couple of kilometers in which the CVs were operating in open traffic. The route counted on pedestrian crossings, signalized intersections, and the PDI elements needed for the deployment of the services.

VIEW DETAILS



Use Ctrl + scroll to zoom map

Ādaži rural road, Latvia

A rural/suburban test site around Ādaži town, situated 25 km from Riga. This site was a part of the Ādaži town and its connecting access roads. The test section comprised roads with different pavement and traffic intensity. Mostly speed limited around the town is 30-50 km/h, but some surrounding roads were classified as rural roads with low traffic intensity. The neighbourhood, including all road intersections, had 5G connectivity provided by LMT.

VIEW DETAILS

Select a PDI enabled CCAM Solution

- 1. Emergency Vehicle (EV) Approaching
- 2. Equipped VRUs Protection
- 3. Non-equipped VRU Protection
- 4. Traffic Management Optimisation based on Vehicle Probe Data from CCAM
- 5. Localisation of Assets and CCAM Vehicles
- 6. Minimum Risk Manoeuvre (MRM)
- 7. Optimised Logistic Operation of AVs
- 8. Insertion
- 9. Temporary Road Works
- 10. Insertion
- 11. Emergency Vehicle Approaching
- 12. UAV-based Non-Equipped VRU Protection
- 13. Road Workers in the field

Select a KPI

- 1. Additional ODD elements (OOD+)
- 2. Level of Minimal Risk Condition (LMRCA)
- 3. Relative change in coverage in terms of service (C_{s,s})
- 4. Smart Road Level of a road segment
- 5. Disengagement rate
- 6. Travelling comfort (actual & perceived)
- 7. User experience & acceptance
- 8. Perceived safety
- 9. Workload
- 10. Service framework communication and data flow reliability
- 11. Restoring time from other threats and Data breaches
- 12. Relative change in response rate
- 13. Relative change in response time
- 14. Relative change in average response position
- 15. Relative change in frequency of unsafe events
- 16. Relative change of crash impact index
- 17. Relative change in deceleration rates
- 18. Relative change in speeding of vehicles
- 19. Relative change in average delay
- 20. Relative change in average travel time
- 21. Relative change in vehicle kilometres travelled (macro)
- 22. Relative change in vehicle hours travelled
- 23. Relative change in person kilometres travelled (macro)
- 24. Relative change in person hours travelled
- 25. Relative change in energy consumption
- 26. Relative change in tailpipe emissions
- 27. Life cycle energy use/km
- 28. Global environmental impacts
- 29. Logistics Sustainability Index
- 30. Logistics Maturity Index
- 31. Logistics Transferability Index
- 32. Production cost for CAV (for OEMs: per PDI unit) per year
- 33. Investment cost on infrastructure (for PDI solution) per year
- 34. Annual operation and maintenance costs on infrastructure (for each PDI solution)
- 35. Annual operation and maintenance costs per CAV (for each PDI solution)

AUGMENTED CCAM aims to understand, harmonize and evaluate in an augmented manner adapted and novel support solutions of Physical, Digital and Communication (PDI) infrastructure, to advance its readiness for large scale deployment of CCAM solutions for all.

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Figure 1 - ACCAM Global Dashboard Homepage

In Figure 1, the Homepage of the Global Dashboard is presented, which consists of three main parts. Firstly, all the AUGMENTED CCAM Test Sites are included in the top part, along with their descriptions. By clicking on the *View Details* button at one of the Test Sites, the user can explore the selected Test Site. More

specifically, they can see the route selected within the Test Site for the project, its description and the associated use cases/ PDI solutions, as shown in Figure 4. In the Test Site details screen (Fig. 3), the user can also explore the KPIs of the Use Cases implemented in the selected Test Site. In Figure 4, we have selected the EMT Bus Depot in Carabanchel, Madrid as an example and one can see the mentioned details. Finally, in the Homepage, there is also the ability to filter the Test Sites based on their key context through the *Filter by Category (Key (Traffic) Context)* drop-down menu included in the Figure below.

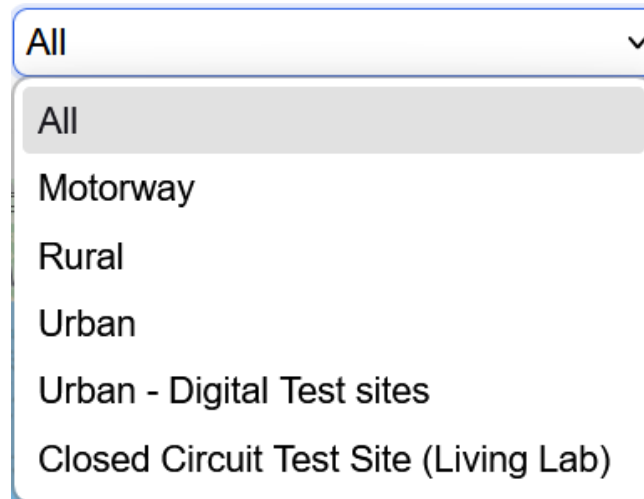
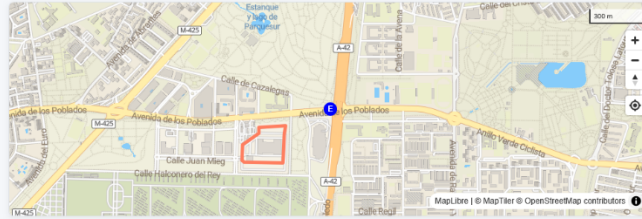


Figure 2 - Key (Traffic) Context filter options

EMT depot semicontrolled environment & surroundings - Carabanchel, Spain



Site Description

Inside and surroundings of EMT bus depot in Carabanchel. This was a semi-controlled area in which the CCAVs were able to interact with other non-automated vehicles (buses) and VRUs, with several pedestrian crossings inside the depot. The EMT bus depot counted on around 400 buses, right in the middle of it is the office building and the garage.

Test Site Specific KPIs

Filter by Use Case

11: Emergency Vehicle Approaching

- 1: Additional ODD elements (ODD+)
- 6: Travelling comfort (actual & perceived)
- 7: User experience & acceptance
- 8: Perceived safety
- 9: Workload
- 12: Relative change in response rate
- 13: Relative change in response time
- 14: Relative change in average response distance
- 19: Relative change in average delay
- 20: Relative change in average travel time
- 27: Life cycle energy use/km
- 28: Global environmental impacts
- 32: Production cost for CAV (for OEMs, per PDI unit) per year
- 33: Investment cost on infrastructure (per PDI solution) per year
- 34: Annual operation and maintenance costs on infrastructure (for each PDI solution)
- 35: Annual operation and maintenance costs per CAV (for each PDI solution)

PDI Enabled CCAM Solutions

- Equipped VRUs Protection
- Emergency Vehicle Approaching
- UAV-based Non-Equipped VRU Protection

Figure 3 - Test Site details screen

In the second part of the Homepage, all the available AUGMENTED CCAM PDI solutions are presented, on which the user can click and learn more about them, their associated KPIs and Test Sites, as shown in Figure 4, in which we have selected the *Localisation of Assets and CCAM Vehicles* PDI enabled CCAM solution from the Homepage as an example.

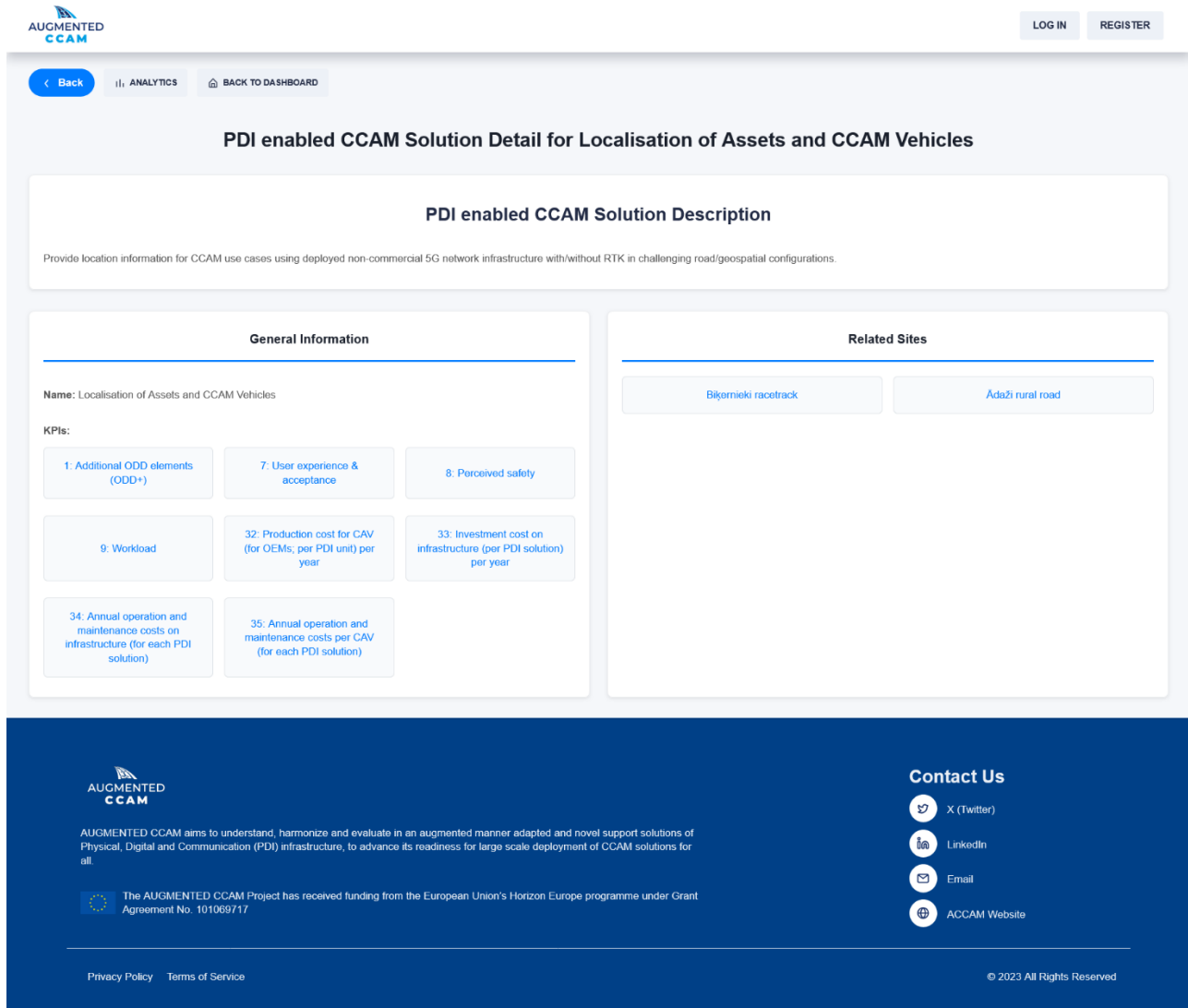


Figure 4 – PDI enabled CCAM Solution-specific screen

In the final part of the Homepage, all the available AUGMENTED CCAM KPIs are shown, and the user can click whichever they want to explore their description, values and associated Test Sites, as shown in Figure 5, in which we have selected KPI 1 – *Additional ODD elements (ODD+)* as an example.

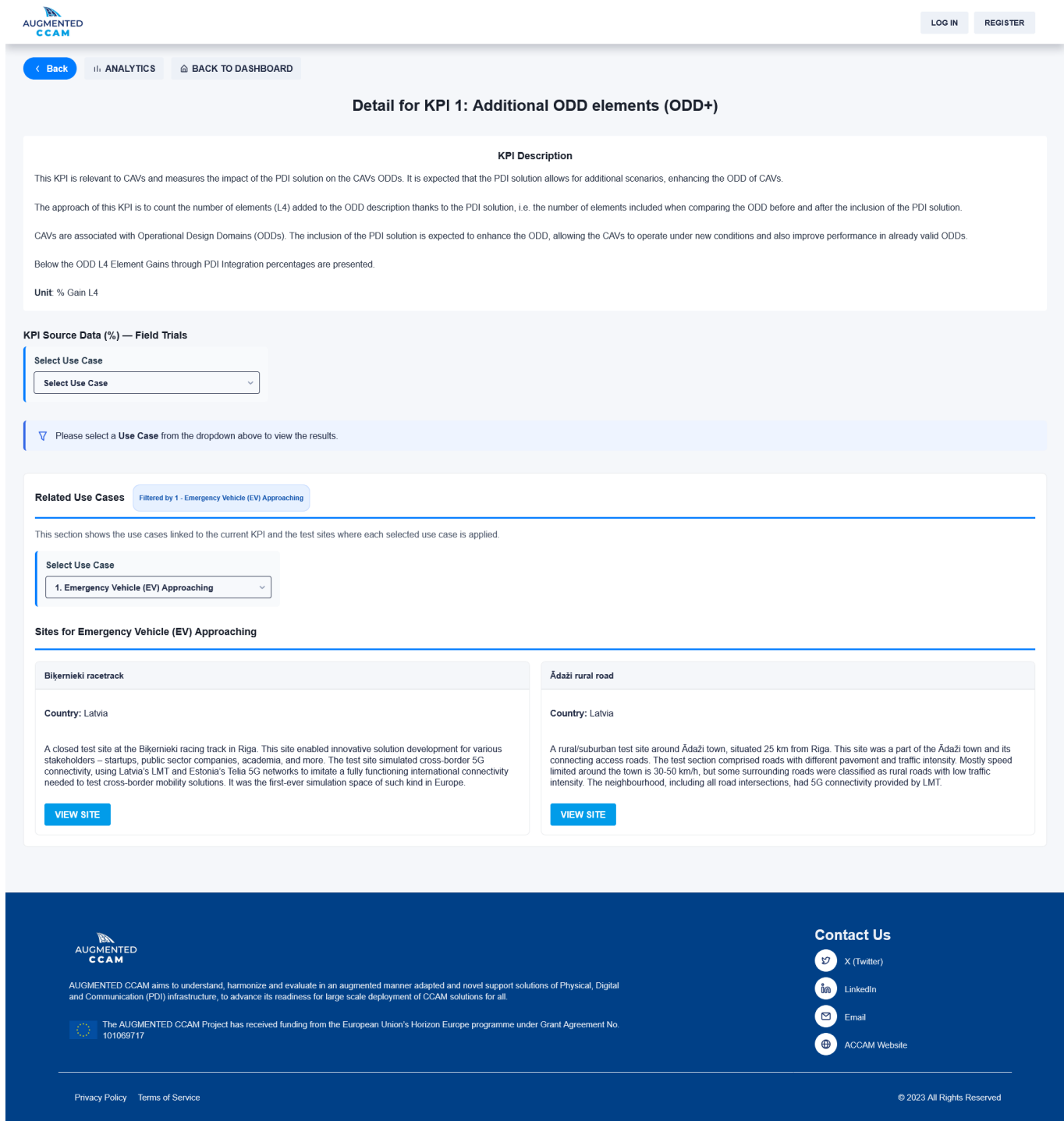


Figure 5 - KPI-specific screen

In the KPI-specific screen, the user can filter the results/values shown by use case if they select one from the drop-down menu named *Select Use Case* on the top left.

In general, a user can interchange between the screens mentioned above by clicking on the links between them which are represented by the associated Test Sites, Use Cases and KPIs found in each of the example

screens (Figures 3, 4 and 5) as an alternative way of navigating instead of always going through the Dashboard Homepage.

The final major screen of the Dashboard is the Analytics screen. This one can be accessed either from the Homepage green button on the top, shown in Figure 6, or by clicking on the *Analytics* button included on the top left in each of the example screens (Figures 4, 5 and 6).



Figure 6 - Analytics button - Homepage

Specifically, if the user selects to navigate to the *Analytics* screen by clicking on the *Analytics* button included in the *KPI-specific screen*, they reach the *Analytics* screen which shows the visualizations of the specific KPI they had selected on the previous screen. If they access the *Analytics* screen in any other way, then they get the default screen asking them to pick a KPI to present the visualizations, as shown in Figure 7.

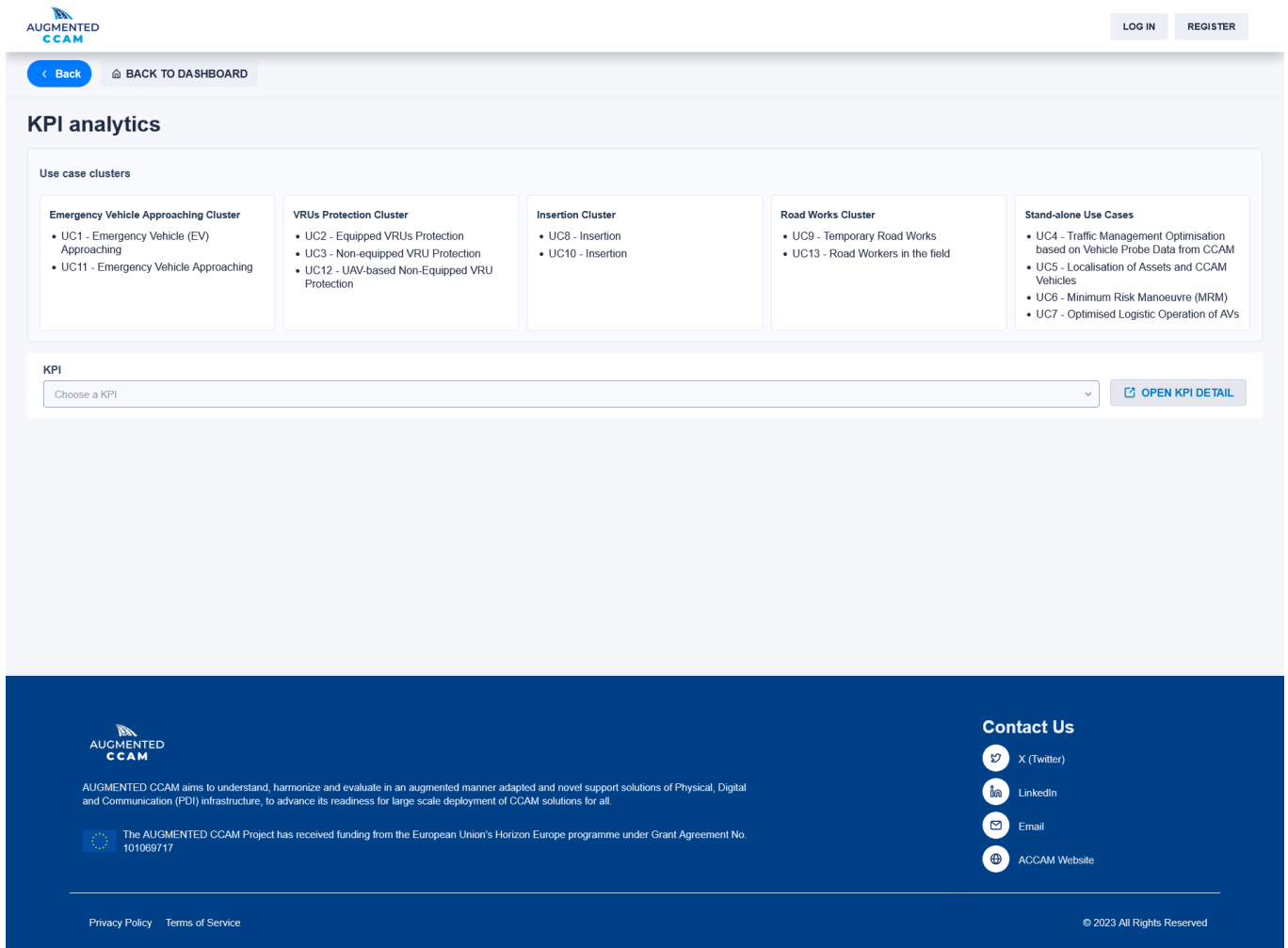


Figure 7 - Analytics default screen

The figures provided below present some examples of the visualisations provided by the Dashboard, where we have selected KPIs 1, 19 and 27 as examples.

KPI analytics

Use case clusters

Emergency Vehicle Approaching Cluster

- UC1 - Emergency Vehicle (EV) Approaching
- UC11 - Emergency Vehicle Approaching

VRUs Protection Cluster

- UC2 - Equipped VRUs Protection
- UC3 - Non-equipped VRU Protection
- UC12 - UAV-based Non-Equipped VRU Protection

Insertion Cluster

- UC8 - Insertion
- UC10 - Insertion

Road Works Cluster

- UC9 - Temporary Road Works
- UC13 - Road Workers in the field

Stand-alone Use Cases

- UC4 - Traffic Management Optimisation based on Vehicle Probe Data from CCAM
- UC5 - Localisation of Assets and CCAM Vehicles
- UC6 - Minimum Risk Manoeuvre (MRM)
- UC7 - Optimised Logistic Operation of AVs

KPI

1. Additional ODD elements (ODD+)

OPEN KPI DETAIL

1. Additional ODD elements (ODD+)

12 rows - 1 measure

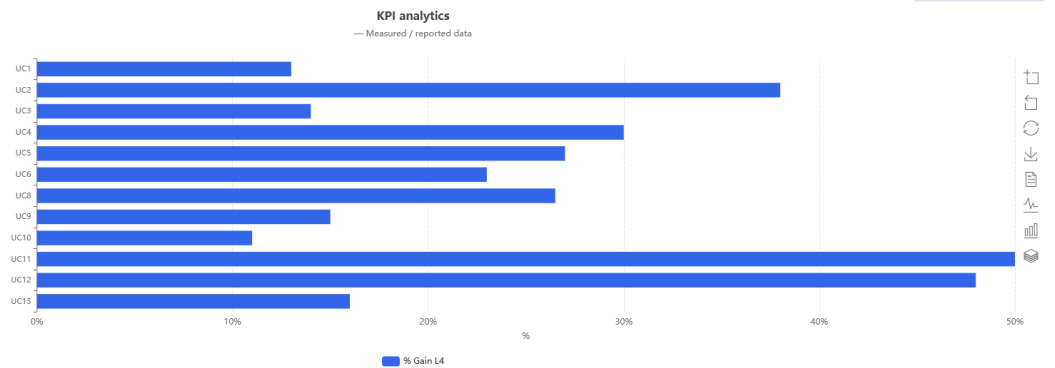


Figure 8 - KPI 1 analytics

KPI analytics

Use case clusters

- Emergency Vehicle Approaching Cluster**
- UC1 - Emergency Vehicle (EV) Approaching
 - UC11 - Emergency Vehicle Approaching

- VRUs Protection Cluster**
- UC2 - Equipped VRUs Protection
 - UC3 - Non-equipped VRUs Protection
 - UC12 - UAN-based Non-Equipped VRUs Protection

- Insertion Cluster**
- UC8 - Insertion
 - UC10 - Insertion

- Road Works Cluster**
- UC9 - Temporary Road Works
 - UC13 - Road Workers in the Field

- Stand-alone Use Cases**
- UC4 - Traffic Management Optimisation based on Vehicle Probe Data from CCAM
 - UC5 - Localisation of Assets and CCAM Vehicles
 - UC6 - Minimum Risk Manoeuvre (MRM)
 - UC7 - Optimised Logistic Operation of AVs

KPI

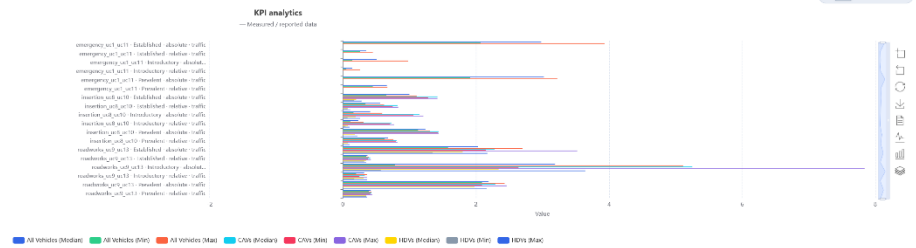
19. Relative change in average delay

OPEN KPI DETAIL

SHOW MACRO SIMULATION CHART KPIs 19-20: optional second chart from macro results.

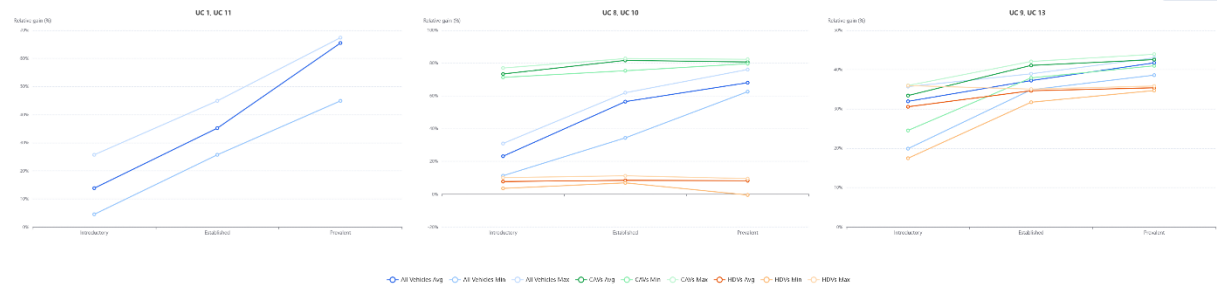
19. Relative change in average delay

19 rows (all scenarios / stages / types shown)



Stage / Scenario progression — Relative gains

3 scenarios (UC 1, UC 11, UC 8, UC 10, UC 9, UC 13) 3 stages



Stage / Scenario progression — Absolute values

3 scenarios (UC 1, UC 11, UC 8, UC 10, UC 9, UC 13) 3 stages

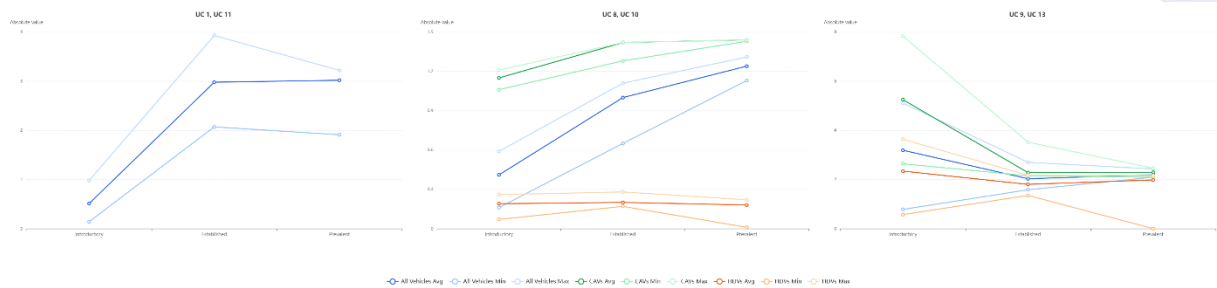


Figure 9 - KPI 19 analytics



Figure 10 - KPI 27 analytics

By using the buttons provided on the right side of the analytics, the user can zoom in or out in the charts to focus on the values of interest, change visualizations, download the results as images and inspect the data tables for each visualization. Finally, by hovering over the charts with their mouse, the user can inspect the specific values of the selected KPIs for each applicable Use Case.