

MODALES
Mobile App

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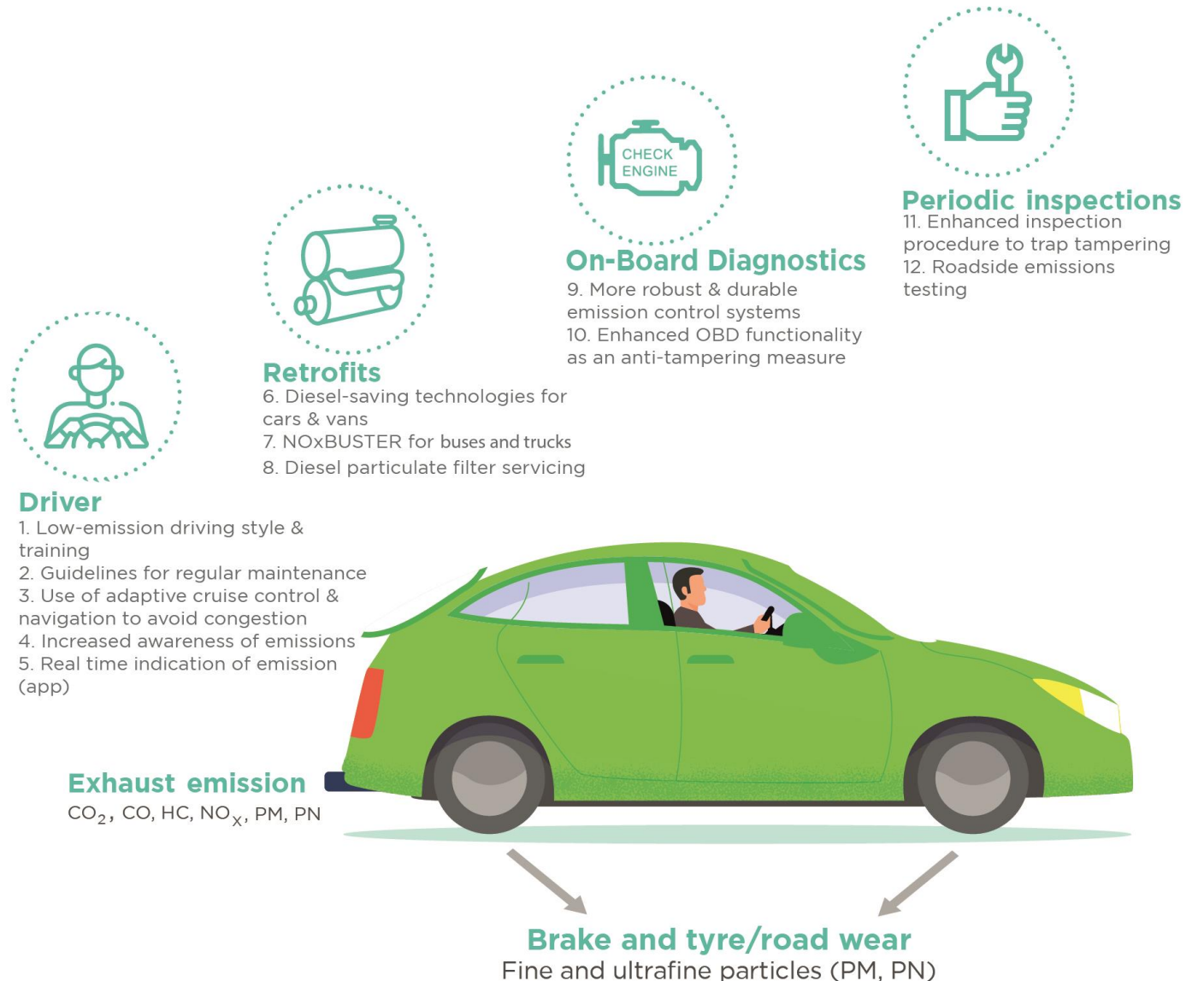
**Luxembourg Institute
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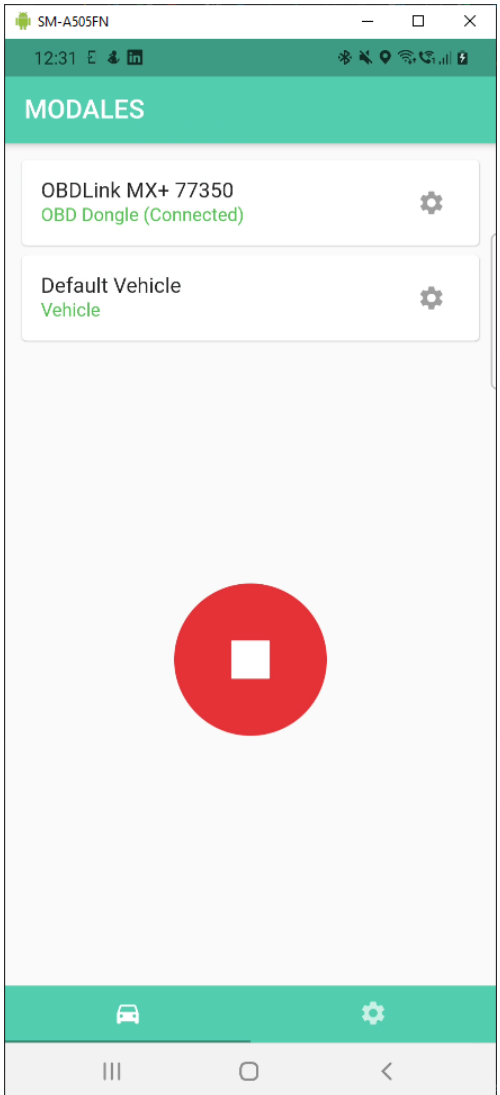
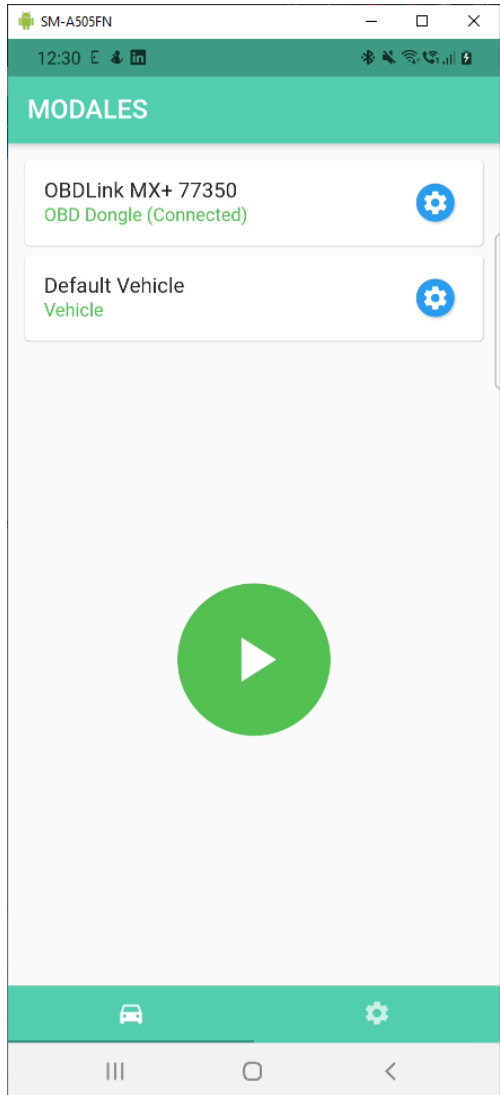
INTRODUCTION: THE MODALES VISION

To **reduce air pollution** from all types of road vehicles (but especially older vehicles) by encouraging adoption of **low-emission driving behaviour** and **proper maintenance choice**

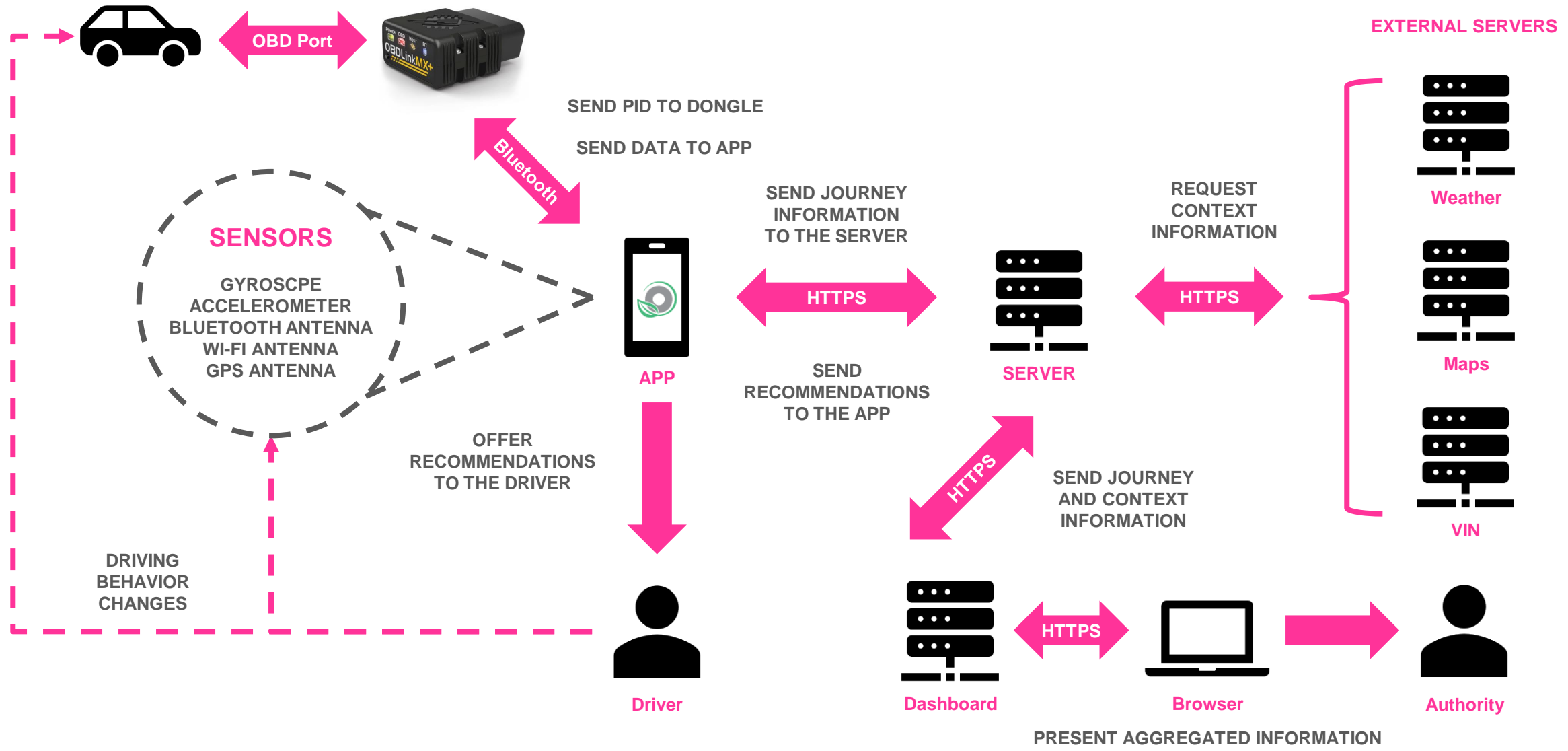
MODALES advances the understanding of the co-variability between user behaviour and vehicle emissions from powertrain, brakes and tyres, in order to modify user behaviour, via training and awareness



Simple user interface



Architecture overview



On-Board Diagnosis (OBD)

More reliable:

- Absolute barometric pressure
- Absolute throttle position
- Accelerator pedal position
- Air flow rate
- Ambient air temperature
- Catalyst temperature
- Engine coolant temperature
- Engine fuel rate
- Engine speed
- Vehicle speed

Less reliable:

- Intake air temperature
- NOx sensor



Context Information

Weather:

- humidity
- temperature
- total snow
- visibility
- wind speed

Traffic:

- historical average speed
- historical free flow speed
- historical jam factor
- historical traversability
- real-time confidence
- real-time traffic speed

Road:

- average roughness category
- curvature
- distance to intersection
- functional class
- has end of no overtaking sign
- has no overtaking sign
- has pedestrian crossing sign
- has stop sign
- has traffic signal
- has yield sign
- heading
- intersection category
- international roughness index
- is bridge
- is intersection
- is long haul
- is ramp
- is roundabout
- is tunnel
- is urban
- lane category
- radius
- road type
- slope
- speed category
- speed limit
- speed limit trucks

Research Challenges

- Learn useful driving indicators from raw data in real time.
- Design a user interface for the journey without compromising safety.
- Build a recommender system.
- Handle different connectivity scenarios.
- Ensure privacy policies.
- Analyse behaviour changes.

Conclusion

- We solved many challenges.
- Started with a data collection campaign in Luxembourg and discovered new challenges.
- Continued with an iterative process, adding more trial sites and new components.
- For the future: we have more campaigns planned on several trial sites, the recommendation system under development, and a lot of exciting data exploration to do!



* As an International Cooperation project, MODALES also plans user trials in Nanjing, China



Smart and
Sustainable
Mobility
for all.

its

EUROPEAN
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TOULOUSE
30 May - 1 June 2022

Thank you!