



**Adapting driver behaviour  
for lower emissions**

## MODALES D1.4: Exploitation Plan – *Executive Summary*

<b>WORK PACKAGE</b>	<b>WP1: Project Management</b>
<b>TASK 1.3</b>	Innovation Management
<b>EDITOR / MAIN AUTHOR</b>	Orhan Alankuş – OKAN UNIVERSITY
<b>DISSEMINATION LEVEL</b>	Full report is Confidential (CO). <b>This document is a non-confidential Executive Summary</b>
<b>STATUS</b>	Final, approved by the European Commission
<b>DUE DATE</b>	30/04/2023
<b>DOCUMENT DATE</b>	09/05/2023
<b>VERSION NUMBER</b>	1.0



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 815189.

## List of abbreviations and acronyms

Abbreviation	Meaning
<b>DOC</b>	Diesel Oxidation Catalyst
<b>DPF</b>	Diesel Particulate Filter
<b>OEM</b>	Original Equipment Manufacturer
<b>PEMS</b>	Portable Emission Measurement System
<b>SCR</b>	Selective Catalytic Reduction

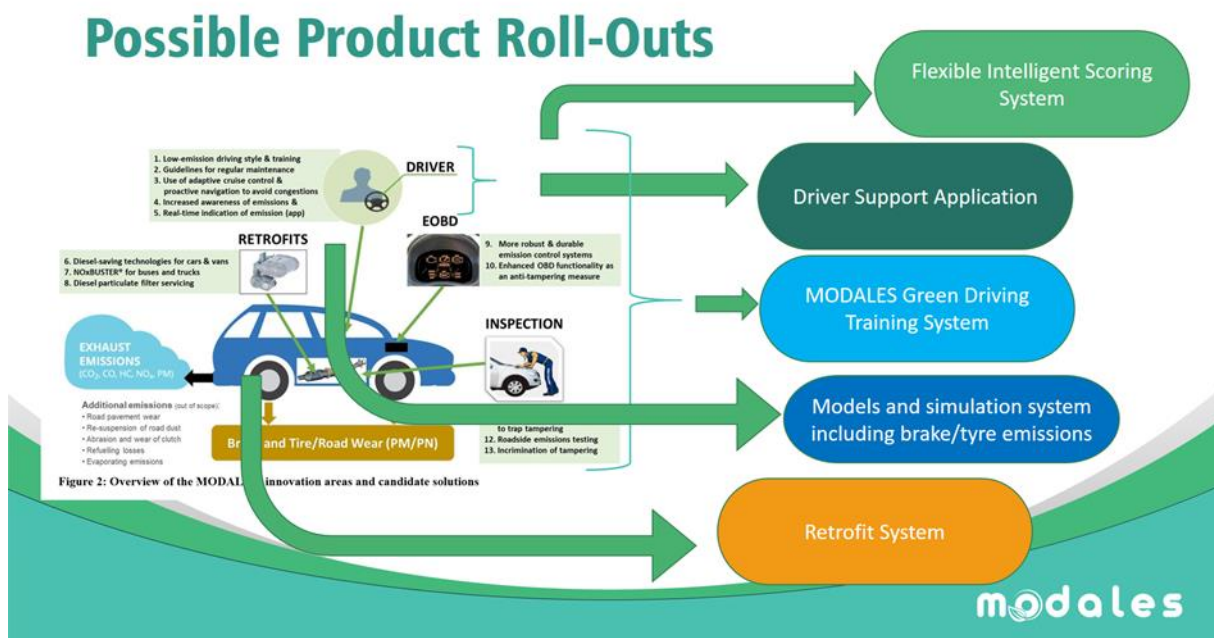
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## Publishable Executive Summary

The MODALES Project had the challenging objective of advancing the fundamental understanding of the co-variability of user behaviour and vehicular emissions characterised by powertrain, brakes and tyres, and modifying user behaviour via training including a driver assistance app and awareness campaigns in order to support effective air quality improvement plans and enforcement strategies to be developed by local and national authorities.

MODALES tackled these objectives through **13 innovation areas** and **11 technology solutions**. These technology solutions have led to five possible exploitable products as shown in the figure below.



An explanation of the possible products is as follows:

### 1. Flexible Intelligent Scoring System (partner: Istanbul Okan University)

The scoring system developed for the MODALES Driver Support Application is a flexible artificial intelligence (AI) based system which can give instantaneous feedback to the driver about her/his driving style. This system is composed of a parametrised training data preparation methodology and an AI algorithm based code to train the system. The trained algorithm then can be run on the real environment and instantaneous and total scores can be obtained. This scoring system can be exploited separately for eco-driving, fleet-driver evaluation or insurance rating purposes.

### 2. Driver Support Application (partner: Luxembourg Institute of Science and Technology – LIST)

This system is the overall application developed for intelligent phones which can receive the vehicle data through OBD interface and/or through the sensors of the intelligent phone. This data is used to calculate the total score and/or instantaneous score to guide the driver during driving. This system can be used for any application in line with how the scoring system is trained.

### 3. **Green Driving Training System** (partner: International Road Transport Union – IRU)

Three short driver training videos of approximately 15 minutes each have been developed for private car drivers, professional van and taxi drivers, as well as truck drivers. The objective of the videos is to provide a user-friendly audio-visual material that can provide drivers with the most important guidelines on how to reduce emissions while driving. An accompanying booklet (downloadable tips from the awareness campaign) is available to explain in more detail the driving style for reducing emissions.

### 4. **Models and Simulation System including brake/tyre emissions** (partner: University of Leeds)

Three simulation models were developed to quantify the relationship between the user's driving behaviour and the resultant vehicle emissions (i.e. powertrain, brake, and tyre), respectively. They were validated using real-world exhaust data from the Portable Emission Measurement System (PEMS), brake wear measurements collected in-lab, and real-world tyre wear measurements. These models were then used to derive and calibrate a set of mathematical equations to produce estimates of vehicle emissions as a result of driving behaviour change.

### 5. **Retrofit System** (partner: Proventia)

A retrofit system for light commercial vehicles have been developed. The Proventia SCR retrofit system is an underfloor installation, substituting the OEM exhaust line located after the OEM DOC/DPF unit. The urea dozer is located in the exhaust line just before SCR catalyst. The urea tank is installed behind the front bumper, in the location where OEM install the tank for models equipped SCR systems.

These products have been analysed for possible exploitation through Lüfteneger's Business Model Radar.



**For more information:**

MODALES Project Coordinator

ERTICO - ITS Europe

Avenue Louise 326

1050 Brussels, Belgium

[info@modales-project.eu](mailto:info@modales-project.eu)

[www.modales-project.eu](http://www.modales-project.eu)



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