Please check our wiki for help on navigating the form.

Horizon 2020

Call: H2020-MG-2018-2019-2020

(2018-2020 Mobility for Growth)

Topic: LC-MG-1-1-2018

Type of action: RIA

Proposal number: SEP-210497537

Proposal acronym: ORESTIN

Deadline Id: H2020-MG-2018-TwoStages

Table of contents

How to fill in the forms

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the steps in the submission wizard.

1 - General information

Topic	LC-MG-1-1-2018	Type of Action	RIA
Call Identifier	H2020-MG-2018-2019-2020	Deadline Id	H2020-MG-2018-TwoStages

Acronym	ORESTIN
Proposal title	On-Road Emission Sensing, Testing and IntegratioN

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months	*36*
Fixed keyword 1	Sensing
Fixed keyword 2	Atmospheric pollution
Fixed keyword 3	Awareness campaigns
Fixed keyword 4	Behavioural change
Fixed keyword 5	International cooperation
Free keywords	*Data platform, Cloud computing, Big data*

Abstract

Substantial efforts are being made by automotive industry and scientists to develop new zero tailpipe emission technologies but they are not likely to replace all existing on-road fleets within a short time to solve the current air quality issue that many cities across the world are facing. Moreover, vehicle emissions can be drastically increased in the case of on-board detection ineffectiveness, tampering or poor durability of depollution systems. There is an urgent need for the emissions from a large number of on-road vehicles to be monitored under the real-world conditions. ORESTIN responds to the call by carrying out (i) the technological advancement of three different types of remote sensing (RS) systems, and (ii) the creation of data infrastructure designed to integrate RS-based emissions data, vehicle registration databases, air quality measurements, and traffic conditions to support city authorities and governmental agencies to evaluate air quality plans and implement enforcement approaches. More specifically, ORESTIN will improve the methods for the effective application of RS systems (e.g. location choice, technical skills and support needed for both installation and maintenance) and develop a number of common and system-specific solutions to advance the RS devices so that they are more robust and accurate, easier-to-deploy, and cost-effective. Furthermore, ORESTIN will integrate and demonstrate a transferable and interoperable cloud-based data platform, serving as decision support tool for automated infringing vehicle enforcement and policy evaluation. Through the course of our project, ORESTIN will validate these RS device improvements, data platform developments, and evidence-based local air quality policy enhancement in four European cities, as well as Hong Kong, and Nanjing (China) – ultimately positioning the EU at the hub of global RS research activities through bilateral cooperation with both Asia and North America.

Remaining characters 33

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under Horizon 2020 or any other EU programme(s)? ○ Yes ◉ No

Please give the proposal reference or contract number.	
xxxxxx-x	

Declarations

1) The coordinator declares to have the explicit consent of all applicants on their participation and on the content of this proposal.	☒
2) The information contained in this proposal is correct and complete.	☒
3) This proposal complies with ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	☒

4) The coordinator confirms:

- to have carried out the self-check of the financial capacity of the organisation on http://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html or to be covered by a financial viability check in an EU project for the last closed financial year. Where the result was "weak" or "insufficient", the coordinator confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check); or	◉
- is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check); or	○
- as sole participant in the proposal is exempt from the financial capacity check.	○

5) The coordinator hereby declares that each applicant has confirmed:

- they are fully eligible in accordance with the criteria set out in the specific call for proposals; and	☒
- they have the financial and operational capacity to carry out the proposed action.	☒
The coordinator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him and declared above. Where the proposal to be retained for EU funding, the coordinator and each beneficiary applicant will be required to present a formal declaration in this respect.	

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

Personal data protection

The assessment of your grant application will involve the collection and processing of personal data (such as your name, address and CV), which will be performed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the purposes and means of the processing of your personal data as well as information on how to exercise your rights are available in the privacy statement. Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Detection and Exclusion system of the European Commission (EDES), the new system established by the Commission to reinforce the protection of the Union's financial interests and to ensure sound financial management, in accordance with the provisions of articles 105a and 108 of the revised EU Financial Regulation (FR) (Regulation (EU, EURATOM) 2015/1929 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU, EURATOM) No 966/2012) and articles 143 - 144 of the corresponding Rules of Application (RAP) (COMMISSION DELEGATED REGULATION (EU) 2015/2462 of 30 October 2015 amending Delegated Regulation (EU) No 1268/2012) for more information see the Privacy statement for the EDES Database.

2 - Participants & contacts

#	Participant Legal Name	Country	Action
1	AUTOMOBIL CLUB ASSISTENCIA SA	ES	
2	AALBORG UNIVERSITET	DK	
3	AKKA INFORMATIQUE ET SYSTEMES	FR	
4	BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION	ES	
5	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	EL	
6	CITY UNIVERSITY OF HONG KONG	HK	
7	inNET Monitoring AG	CH	
8	Jiangsu Suli Environmental Science And Technology Co.,Ltd	CN	
9	OPUS RS EUROPE S.L.	ES	
10	SOUTHEAST UNIVERSITY	CN	
11	Systech Sweden AB	SE	
12	UNIVERSITY OF LEEDS	UK	

2 - Administrative data of participating organisations

PIC	***Legal name***
956612352	*AUTOMOBIL CLUB ASSISTENCIA SA*

Short name: ACASA

Address of the organisation

Street AVENIDA DIAGONAL 687

Town BARCELONA

Postcode 08028

Country Spain

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

Legal person .....yes

Industry (private for profit).....yes

Enterprise Data

SME self-declared status.....29/04/1986 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Mobility Area ☐ not applicable

☒ Same as organisation address

Street: AVENIDA DIAGONAL 687

Town: BARCELONA

Postcode: 08028

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr. Sex: (•) Male ( ) Female

First name: **Marc** Last name: **Figuls**

E-Mail: **marc.figuls@racc.es**

Position in org.: Mobility & Road Safety project manager

Department: Mobility Area ☐ Same as organisation name

☒ Same as organisation address

Street: AVENIDA DIAGONAL 687

Town: BARCELONA Post code: 08028

Country: Spain

Website:

Phone: +34934955000 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Haibo	Chen	haibochen09@gmail.com	+xxx xxxxxxxxx
Lluis	Puerto	lluis.puerto@racc.es	+xxx xxxxxxxxx

PIC	***Legal name***
999904034	*AALBORG UNIVERSITET*

Short name: AAU

Address of the organisation

Street FREDRIK BAJERS VEJ 5

Town AALBORG

Postcode 9220

Country Denmark

Webpage www.aau.dk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....23/05/2016 - no

SME self-assessment .....23/05/2016 - no

SME validation sme.....31/07/1963 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Department of Comuter Science ☐ not applicable

☐ Same as organisation address

Street: Selma Lagerlofs Vej 300

Town: Aalborg Øst

Postcode: 9220

Country: Denmark

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Kristian**

Last name: **Torp**

E-Mail: **torp@cs.aau.dk**

Position in org.: Associate Professor

Department: Department of Computer Science ☐ Same as organisation name

☐ Same as organisation address

Street: Selma Lagerlofs Vej 300

Town: Aalborg Øst

Post code: 9220

Country: Denmark

Website: www.cs.aau.dk

Phone: +45 99409940

Phone 2: +45 9940 7222

Fax: +45 9940 9798

PIC	***Legal name***
985944279	*AKKA INFORMATIQUE ET SYSTEMES*

Short name: AKKA

Address of the organisation

Street 892 Rue Yves Kermen

Town Boulogne Billancourt

Postcode 92100

Country France

Webpage www.akka.eu

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

Legal person .....yes

Industry (private for profit).....yes

Enterprise Data

SME self-declared status.....13/01/1982 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Akka Research ☐ not applicable

☐ Same as organisation address

Street: 7 Boulevard Henri Ziegler

Town: BLAGNAC

Postcode: 31700

Country: France

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr. Sex: (•) Male ( ) Female

First name: **Sylvain** Last name: **NOUREAU**

E-Mail: **sylvain.noureau@akka.eu**

Position in org.: Collaborative Project Manager

Department: Akka Research ☐ Same as organisation name

☐ Same as organisation address

Street: 7 Boulevard Henri Ziegler

Town: BLAGNAC Post code: 31700

Country: France

Website: www.akka.eu

Phone: +33684708654 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Benoit	Baurens	benoit.baurens@akka.eu	*+33536251000*

PIC	***Legal name***
999655520	*BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION*

Short name: BSC

Address of the organisation

Street Calle Jordi Girona 31

Town BARCELONA

Postcode 08034

Country Spain

Webpage www.bsc.es

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....01/03/2005 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Earth Sciences ☐ not applicable

☒ Same as organisation address

Street: Calle Jordi Girona 31

Town: BARCELONA

Postcode: 08034

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Marc** Last name: **Guevara**

E-Mail: **marc.guevara@bsc.es**

Position in org.: Postdoctoral Researcher

Department: Earth Sciences ☐ Same as organisation name

☒ Same as organisation address

Street: Calle Jordi Girona 31

Town: BARCELONA Post code: 08034

Country: Spain

Website: www.bsc.es

Phone: +34 934137725 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Mar	Rodriguez	mar.rodriguez@bsc.es	*+34 934137566*

PIC	***Legal name***
998802502	*ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS*

Short name: CENTRE FOR RESEARCH AND TECHNOLOGY HELLAS CERTH

Address of the organisation

Street CHARILAOU THERMI ROAD 6 KM

Town THERMI THESSALONIKI

Postcode 57001

Country Greece

Webpage WWW.CERTH.GR

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....04/03/2009 - no

SME self-assessment ..... unknown

SME validation sme.....04/03/2009 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Horizontal Activities ☐ not applicable

☒ Same as organisation address

Street: CHARILAOU THERMI ROAD 6 KM

Town: THERMI THESSALONIKI

Postcode: 57001

Country: Greece

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr.

Sex: (•) Male ( ) Female

First name: **Dimitris**

Last name: **Margaritis**

E-Mail: **dmarg@certh.gr**

Position in org.: Head of Exploitation Research Results Lab

Department: Horizontal Activities

☐ Same as organisation name

☒ Same as organisation address

Street: CHARILAOU THERMI ROAD 6 KM

Town: THERMI THESSALONIKI

Post code: 57001

Country: Greece

Website: www.imet.gr

Phone: +30 2310498467

Phone 2: -

Fax: -

PIC	***Legal name***
999621376	*CITY UNIVERSITY OF HONG KONG*

Short name: HKC

Address of the organisation

Street TAT CHEE AVENUE, KOW LOON

Town HONG KONG

Postcode

Country Hong Kong

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: School of Energy and Environment ☐ not applicable

☒ Same as organisation address

Street: TAT CHEE AVENUE, KOW LOON

Town: HONG KONG

Postcode: *Area code.*

Country: Hong Kong

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof.

Sex: (•) Male ( ) Female

First name: **Zhi**

Last name: **Ning**

E-Mail: **ning.cityu@gmail.com**

Position in org.: Associate Professor

Department: School of Energy and Environment

☐ Same as organisation name

☒ Same as organisation address

Street: TAT CHEE AVENUE, KOW LOON

Town: HONG KONG

Post code:

Country: Hong Kong

Website: www.ninglab.org

Phone: +85234424620

Phone 2: *+xxx xxxxxxxxx*

Fax: +85234420688

PIC	***Legal name***
913058382	*inNET Monitoring AG*

Short name: inNET

Address of the organisation

Street Dätwylerstrasse 15

Town Altdorf

Postcode 6460

Country Switzerland

Webpage www.innetag.ch

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....unknown

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

Legal person .....yes

Industry (private for profit).....unknown

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

No department involved

Department name: *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as organisation address

Street: *Please enter street name and number.*

Town: *Please enter the name of the town.*

Postcode: *Area code.*

Country: *Please select a country*

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr. Sex: (•) Male ( ) Female

First name: **Justin** Last name: **D'Atri**

E-Mail: **datri.justin@innetag.ch**

Position in org.: International Project Leader

Department: inNET Monitoring AG ☒ Same as organisation name

☒ Same as organisation address

Street: Dätwylerstrasse 15

Town: Altdorf Post code: 6460

Country: Switzerland

Website: www.innetag.ch

Phone: +41768168991 Phone 2: +41 41 500 50 40 Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Christian	Ruckstuhl	christian.ruckstuhl@innetag.ch	*+41 41 500 50 40*

PIC	***Legal name***
908465820	*Jiangsu Suli Environmental Science And Technology Co.,Ltd*

Short name: Jiangsu Suli Environmental Science And Technology Co.,Ltd

Address of the organisation

Street No.241,Fenghuang West Street

Town Nanjing

Postcode 210036

Country China (People's Republic of)

Webpage www.jsem.net.cn

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....unknown

Non-profit .....unknown

International organisation .....unknown

International organisation of European interest .....unknown

Secondary or Higher education establishment .....unknown

Research organisation .....unknown

Legal person .....yes

Industry (private for profit).....unknown

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Sensing and Monitoring ☐ not applicable

☒ Same as organisation address

Street: No.241,Fenghuang West Street

Town: Nanjing

Postcode: 210036

Country: China (People's Republic of)

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr.

Sex: (•) Male ( ) Female

First name: **Jiankang**

Last name: **Shen**

E-Mail: **sjk189@163.com**

Position in org.: Senior engineer

Department: Sensing and Monitoring

☐ Same as organisation name

☒ Same as organisation address

Street: No.241,Fenghuang West Street

Town: Nanjing

Post code: 210036

Country: China (People's Republic of)

Website: www.jsem.net.cn

Phone: (+86) 13382065387

Phone 2: +xxx xxxxxxxxx

Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Xuejiao	Zhu	zhuxuejiaos@163.com	+xxx xxxxxxxxx

PIC	***Legal name***
935423284	*OPUS RS EUROPE S.L.*

Short name: OPUSRSE

Address of the organisation

Street C/Gaztambide 45

Town Madrid

Postcode 28015

Country Spain

Webpage http://www.opusrse.com

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....unknown

International organisation .....unknown

International organisation of European interest .....unknown

Secondary or Higher education establishment .....unknown

Research organisation .....unknown

Legal person .....yes

Industry (private for profit).....unknown

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

No department involved

Department name: *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as organisation address

Street: *Please enter street name and number.*

Town: *Please enter the name of the town.*

Postcode: *Area code.*

Country: *Please select a country*

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr.

Sex: (•) Male ( ) Female

First name: **Javier**

Last name: **Buhigas**

E-Mail: **javier.buhigas@opusrse.com**

Position in org.: Head of technical consultancy

Department: OPUS RS EUROPE S.L.

☒ Same as organisation name

☒ Same as organisation address

Street: C/Gaztambide 45

Town: Madrid

Post code: 28015

Country: Spain

Website:

Phone: +34915592868

Phone 2: *+xxx xxxxxxxxx*

Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Josefina	de la Fuente	josefina.fuente@opusrse.com	*+34658579766*

PIC	***Legal name***
986338875	*SOUTHEAST UNIVERSITY*

Short name: SOUTHEAST UNIVERSITY

Address of the organisation

Street SI PAI LOU STREET _ XUAN WU DISTRICT 2

Town NANJING

Postcode 210096

Country China (People's Republic of)

Webpage http://www.seu.edu.cn/

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: School of Transportation ☐ not applicable

☒ Same as organisation address

Street: SI PAI LOU STREET _ XUAN WU DISTRICT 2

Town: NANJING

Postcode: 210096

Country: China (People's Republic of)

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Tiezhu**

Last name: **Li**

E-Mail: **42434300@qq.com**

Position in org.: Professor

Department: School of Transportation

☐ Same as organisation name

☒ Same as organisation address

Street: SI PAI LOU STREET _ XUAN WU DISTRICT 2

Town: NANJING

Post code: 210096

Country: China (People's Republic of)

Website: www.seu.edu.cn

Phone: (+86) 1813648179

Phone 2: *+xxx xxxxxxxxx*

Fax: *+xxx xxxxxxxxx*

PIC	***Legal name***
908474162	*Systech Sweden AB*

Short name: Systech Sweden AB

Address of the organisation

Street Skattegårdsvägen 122

Town Vällingby / Stockholms län

Postcode 162 50

Country Sweden

Webpage www.SystechSweden.se

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

Legal person .....yes

Industry (private for profit).....yes

Enterprise Data

SME self-declared status.....31/12/2016 - no

SME self-assessment .....31/12/2016 - no

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

No department involved

Department name: *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as organisation address

Street: *Please enter street name and number.*

Town: *Please enter the name of the town.*

Postcode: *Area code.*

Country: *Please select a country*

Dependencies with other proposal participants

Character of dependence	***Participant***	
Same Group	OPUS RS EUROPE S.L.	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

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Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....no

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....31/07/2015 - no

SME self-assessment .....31/07/2015 - no

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

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3 - Budget

Total requested EU contribution for the proposal/ €	3 800 000

ORESTIN - On-Road Emission Sensing, Testing and IntegratioN

LC-MG-1-1-2018-**C** "Sensing and Monitoring Emission in Urban Road Transportation System"

1. Excellence

The goal of ORESTIN is to advance the technological development of ***three typical remote sensing systems*** and demonstrate their improved performances for monitoring emissions of existing on-road fleets (in particular those with emission-affecting modifications) in order to provide local authorities and regulatory bodies with a fuller picture of the traffic-based air pollution necessary to develop ***effective traffic management policy solutions***, deliver ***sustainable air quality plans***, and ***infringing vehicle enforcement approaches***.

ORESTIN will create a transferable and interoperable cloud-based data platform, serving as ***a policy evaluation and decision support tool***, on which vast quantities of heterogeneous sensor data can be integrated, modelled, and interpreted, in order for air quality plans and enforcement solutions to be tested and deployed.

1.1. Objectives

1.1.1. The Challenge

Although the EU is ambitiously committed to the UN Sustainable Development Goals to reduce the environmental impact of air pollution in cities and air pollution related deaths[1], vehicle emissions still continue to cause a significant contribution to the ongoing air pollution across Europe[2]. It is well known that vehicles are a main contributor to air pollution and the associated health problems[3], yet improvements in vehicle emission standards to date have yet to achieve the expected overall air pollution reductions. This is partly due to the fact that there exist significant differences between vehicle emissions ratings in the lab and what is actually emitted during real-world driving conditions[4]. Given these circumstances, Remote Sensing (RS) of infringing vehicles has the opportunity to become a key complement to traditional air quality monitoring networks, and a means for ultimately identifying these infringing vehicles and getting them repaired or taken off the road in order to improve overall Air Quality (AQ).

Even if RS is a clear answer for the identification and enforcement of infringing vehicles, there are still many technical, methodological, and data related obstacles to widespread adoption that need to be overcome to make RS more effective at scale. Methods for their useful application are limited to most local authorities interested in their use for enforcement purposes and the RS systems lack powerful enough data processing to improve their accuracy under non-ideal situations like multi-lane traffic and variability in tailpipe location. Therefore, the ORESTIN consortium, consisting of RS hardware manufacturers, big data specialists, clean transportation experts, and AQ scientists, will combine improvements to the data processing of the RS devices while at the same time standardizing the methods of their effective application to support more cost-effective use by local city authorities. Furthermore, we will go one step beyond and fully integrate RS tools into a next generation AQ Decision Support & Monitoring Platform in order to enable Smart Cities to more intelligently manage their AQ and reduce emissions by infringing vehicles through optimized enforcement approaches. For the ORESTIN project to be successful, there are four main challenges that need to be addressed. These obstacles are described as follows.

Challenge #1: Remote Sensing Technology Limitations - The main purpose of on-road Remote Sensing (RS) is the ability to detect pollutants (e.g. CO, NOx, PM, HC) from vehicle tailpipes, instantly under real-world driving conditions, in a non-intrusive way as a means of identifying "high emitter" vehicles. Although RS installations can be configured for sensing tailpipes at various heights, little research has been done to validate their

[1] http://ec.europa.eu/environment/air/reduction/index.htm

[2] Yim SHL and Barrett SRH (2012), "Public Health Impacts of Combustion Emissions in the United Kingdom", Environ. Sci. Technol., 46 (8), pp. 4291–4296, doi: 10.1021/es2040416.

[3] Jonson JE et al. (2017), "Impact of excess NOx emissions from diesel cars on air quality, public health and eutrophication in Europe", Environ. Res. Lett. 12, 094017.

[4] Anenberg et al. (2017), "Impacts and mitigation of excess diesel-related NOx emissions in 11 major vehicle markets, Nature 545, pp. 467–471, doi: 10.1038/nature22086.

accuracy and reliability under heterogeneous traffic situations and variable driver behaviour. Furthermore, the equipment remains expensive due to the lack of wide-scale adoption of the devices, the high-quality precision of the laser-based sensors, and the high-skill level required for their effective deployment/operation.

Challenge #2: Lack of Scalable Data Infrastructure - In addition to the 'sensing-based' limitations described above, there is a lack of a scalable data infrastructure that enables national and city-level AQ Managers to easily be able to make sense of the collected data and make intelligent management decisions. This lack of a scalable data infrastructure in cities nullifies the potential benefits of RS device (RSD) data to support the development of robust vehicle registration-based enforcement approaches or policy scenario evaluations.

Challenge #3: Enforcement approaches undefined - Although the potential for RSDs to enable the more precise enforcement of AQ plans and vehicle emissions regulation is quite obvious, many city and national administrations are still lacking the proven detailed management approaches. If cities want to be able to determine the most cost-effective and impactful vehicle emissions policies and infringing vehicle enforcement approaches, there is a clear need for decision support tools that enable city administrations to simulate and validate their policies before moving forward with implementation and investment.

Challenge #4: Difficult for Cities to adopt new technology - Currently in the emerging field of On-Road Remote Sensing, best practices regarding the effective use and operation of RSDs are limited to only a few experts and not yet available to the city level administrators responsible for enforcing and managing local AQ.

1.1.2. Objectives

Directly addressing the challenges above, ORESTIN aims to further the technological development of RSDs in terms of performance and cost-effective operation, while at the same time integrating these RS improvements into a next generation data infrastructure – ultimately enabling the robust support of AQ plans and infringing vehicle enforcement approaches. In order to achieve this ambition, the following specific objectives have been formulated, which are realistic and achievable within the duration of the project.

Objective #1: Remote Sensing Technology Improvements - To directly improve the performance and cost-effective application of two RS systems (Roadside and Chasing Vehicles) and benchmark their performance against a less proven emerging technology based on Portal installations (EDAR). ORESTIN will make improvements to installation configurations and data processing of Roadside and Chasing Vehicle systems to enable higher accuracy measurements under multi-lane heterogeneous traffic situations while still achieving an appropriate cost-effectiveness and ease-of-use for less skilled technicians.

Objective #2: Decision Support & Monitoring Platform - To develop a highly replicable and interoperable Decision Support & Monitoring Platform which enables city administrations to have more intelligent and user-friendly tools to support local AQ plan management and monitoring, policy scenario evaluation, and automated infringing vehicle enforcement.

Objective #3: Development of Enforcement Policies - To collaborate directly with local city authorities from the demonstration cities in order to develop and evaluate a suite of infringing vehicle enforcement policies based on emerging best practices that can be effectively implemented and in compliance of the EU's General Data Protection Regulation (GDPR).

Objective #4: Replicability & Transferability - To develop project outputs that are not just benefiting the long-term operation and sustainable funding of our demo city partners, but also enables other interested cities to easily adopt our RSD deployment methods, Decision Support Platform, and suite of evaluated Enforcement Policies.

1.2. Relation to the Work Programme

ORESTIN specifically addresses the challenge and scope of **Topic C** "Sensing and monitoring emission in urban road transportation system" of the call "LC-MG-1-1-2018: InCo flagship on reduction of transport impact on AQ", as explained in detail below, showcasing ORESTIN's response to the work programme text.

Further technological development of remote sensing techniques is needed to improve performance, reduce costs, facilitate use by unskilled personnel and achieve a broader deployment potential.
ORESTIN response: Based on the unique advantages and disadvantages of the three different types of RSDs, technical and methodological improvements will be focused on improving the interoperability of data acquisition systems, increased accuracy under multi-lane and heterogeneous traffic situations, increased unattended operation time for less skilled personnel, and enhanced system modularity for improved ease-of-use and cost-effectiveness. Further elaboration of the technological improvements goals of the RSDs can be found in the Section 1.3.2 Methodology – which will be described later in greater detail in the Stage 2 proposal.

To establish a proper data infrastructure built around vehicle registration data-bases, traffic management measures and air quality monitoring systems.
ORESTIN response: ORESTIN will design and implement a scalable cloud-based intelligent data integration and analysis platform leveraging High Performance Computing and Big Data analytics to enable quasi-real-time data processing and visualisation. Privacy by design strategies will be considered in order to protect any private data (GDPR compliance). The data infrastructure will be built on open-source components (including FIWARE generic enablers where possible) with great scalability and replicability that can be deployed on different cloud providers or on-premise. This idea will be tested in ORESTIN between the selected cities. Further, the infrastructure will support that different data-mining tool-kits can be applied on both commodity and specialized hardware. The non-private part of the data is made available for the public to see the benefits of the ORESTIN project and data re-use. In addition, other research institutions can get access to the data.
To demonstrate the system in several cities.
ORESTIN response: Through cooperation with Chinese partners in the ORESTIN consortium, we will conduct demonstration activities in four cities in Europe, one in Hong Kong and one in China, including field campaign measurements, emissions data matching with vehicle technical data and emissions data analysis. The measurement campaigns will provide us with data from different climate and weather conditions and different traffic characteristics (e.g. a mix of vehicle fleets, types of roads). The information will allow us to advance our knowledge of further technological development of the selected RS systems, and help us optimise the operational performance of the RS systems to suit local conditions. ORESTIN will also identify a network of 'follower' cities, in particular Chinese cities where inhabitants are suffering from extremely severe air pollution, and encourage these cities to participate in ORESTIN's demonstrations via workshops, forums etc.
To support local air quality plans, and to help national and local enforcement authorities in identifying and prosecuting infringing vehicles.
ORESTIN response: ORESTIN will support local AQ plans and enforcement of infringing vehicles in three distinct ways, (1) by providing improved measurements of vehicle emissions and recommendations to local authorities for incorporating RS tools into their vehicle infringement enforcement approach; (2) enabling each city to adopt the ORESTIN decision support platform and combine it with AQ modelling tools in order to evaluate specific low emission policies as well as monitor real-world fluctuations of AQ in higher city-scale resolutions for more optimized management; and (3) creating and sharing replication Blueprints that can enable other cities to quickly adopt ORESTIN RS Tools, Decision Support Platform, and Enforcement policies.
To encourage international cooperation, in particular with China, and design this international cooperation flagship to address similar situations in many cities around the world.
ORESTIN response: The ORESTIN consortium is comprised of partners in Europe and from China. They will exchange knowledge, analytical skills and best practice experiences throughout the project. Individual ORESTIN partners also have their own global networks through which they will promote international cooperation to address similar vehicle emissions and air quality issues such as the United States EPA, and the UnivLeeds' long-term collaborators in the broad fields of monitoring, modelling, mapping and management of vehicle emissions and traffic-related air pollution including Universidad Nacional (Colombia), Federico Santa María University (Chile) and NED University of Engineering & Technology (Pakistan).

1.3. Concept and methodology

1.3.1. ORESTIN Concept

ORESTIN proposes a balanced approach to (a) improving the ***technological limitations*** of the three widely used RS techniques, and (b) creating an advanced ***cloud-based policy evaluation and decision support tool*** for AQ plans and enforcement capable of integrating and modelling data from various sources such as vehicle registration databases, traffic and weather conditions, AQ monitoring measurements as well as complementary emissions data generated by other sensing equipment such as PEMS (which is specifically addressed in subtopic A of the same call). A high-level overview of the ORESTIN project concept is depicted in Figure 1.

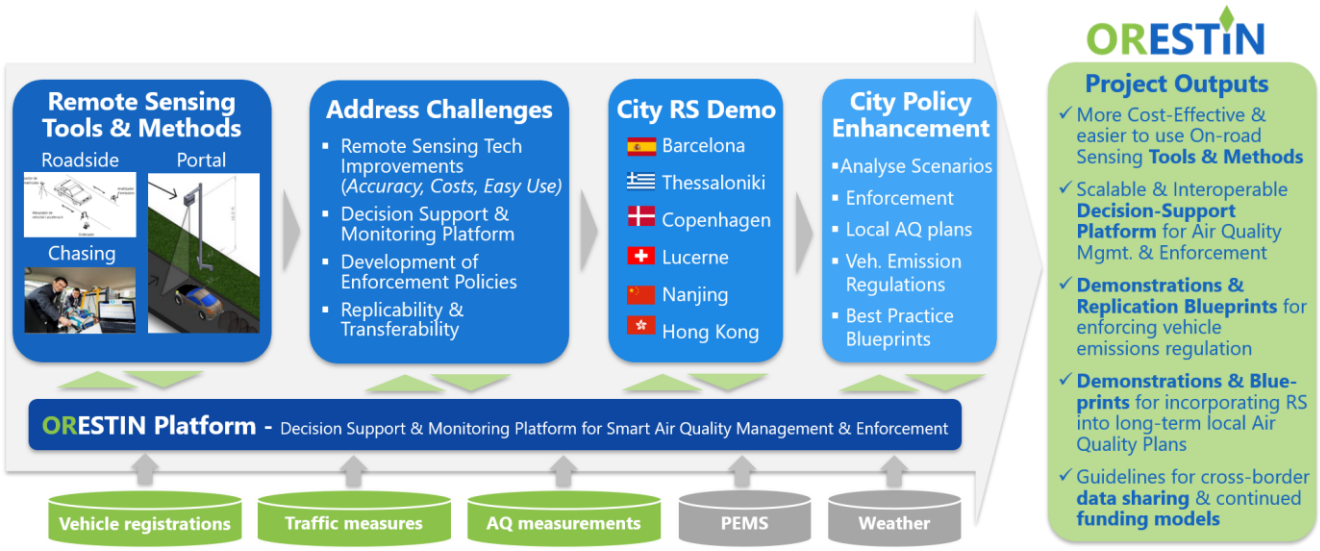


Figure 1: Project Concept for ORESTIN

The project concept is made of 6 elements leading to the Project Outputs. The concept elements consist of:

1. **RS Tools and Methods:** refers to the three types of Remote Sensing Tools (Roadside, Chasing Vehicles, and Portal-based) we aim to improve and benchmark with technical advancements, as well as enhancements to the effectiveness of the methods used for their deployment and operation.
2. **Address Challenges:** refers to the 4 main challenges that we aim to overcome through our project efforts in order to make RS technology to be more *accurate, cost-effective, and easier-to-use*, while at the same time providing cities with a scalable Decision Support & Monitoring Platform that enables improved policy evaluation and wide-spread adoption of RS-enabled automatic enforcement approaches.
3. **ORESTIN Platform:** refers to the underlying data infrastructure that powers our interoperable cloud-based Decision Support & Monitoring Platform for smart air quality management and enforcement.
4. **City RS Demos:** refers to the European and Asian cities in which we will deploy the 3 different RSDs and the ORESTIN Platform demonstrations, as a means of proving our technical improvements and supporting cities to adopt enforcement and enhanced air quality management approaches.
5. **City Policy Enhancement:** refers to the direct support given to the project's partner cities in order to support them in evaluating the effectiveness of different vehicle emissions and air quality management policy scenarios, as well as developing the replication Blueprints for wider-scale transferability of our improved RSDs, deployment methods, and Data Platforms based on our emerging best practices.
6. **Integrated External Databases:** refers to the external databases that will be integrated into the ORESTIN Platform such as Vehicle registrations, local Traffic Management data, local Air Quality Monitoring data, PEMS, and even local Weather-related data.

1.3.2. Methodology

The overall project methodology consists of three main work streams; 1) RS Tools & Methods Development and 2) Decision Support & Monitoring Platform Development that merge into a single work stream 3) City Demonstrations & Impact Dissemination which consists of deploying the improved RS Tools/Methods and Platform within each partner city and adopting newly developed enforcement approaches that enable a sustainable funding model for the ORESTIN system to live on beyond the initial H2020 project.

Work stream #1: RS Tools and Methods Development - The first of our initially parallel work streams will commence by prioritizing the design of the RS improvements to both the Roadside and Chasing Vehicle type systems while also designing the comparative benchmarking analysis with the Portal-based EDAR RS system. We believe the following technological improvements goals of the OPUS Roadside and OPCAS Chasing Vehicle systems will enable a more effective and wider scale adoption and facilitate their use with less skills:

- *Improved performance of data acquisition system and data integration interfaces*
- *Increased accuracy and reliability of measurement under multi-lane and heterogeneous traffic situations through enhanced data processing & analysis*
- *Increased unattended operation time*
- *Enhanced modularity of devices for improved Ease-of-Use & Cost-Effectiveness*
- *Expanded set of installation options, use-case guidelines, & operation methodologies*
- *Improved user interfaces for calibration*

Work stream #2: Decision Support & Monitoring Platform Development - The other initially parallel work stream will begin by building a first prototype of the ORESTIN Decision Support & Monitoring Platform according to the requirements set forth by the Local City Authorities and Expert Advisory Board. We anticipate a wide variety of end-users with different levels of skills, therefore, a specific attention will be given to the accessibility of data analytics and the overall platform usability. The interoperable cloud-based platform, described below in Figure 2, consists of a suite of intelligent service modules and integrated databases that create the next generation of smart AQ management & enforcement.

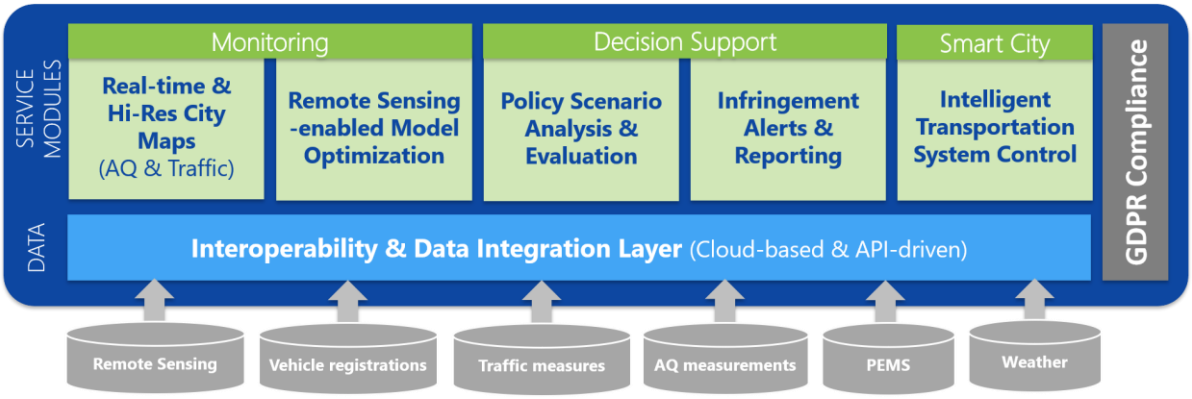


Figure 2: Architectural overview of ORESTIN Decision Support & Monitoring Platform

Work stream #3: City Demonstrations - ORESTIN's demonstration cities were selected in order have a representative sample of different city size scales across Europe and Asia which all have a relatively high level of technological and regulatory maturity regarding AQ and Traffic Management. Furthermore, we also made sure the selected cities have expressed willingness to operate the ORESTIN program beyond the H2020 project. Figure 3 identifies which Remote Sensing and Platform demonstrations will take place in each city.

Location & Type of Demo	REMOTE SENSING DEMO				PLATFORM DEMO			
	Roadside RS	Chasing Vehicle RS	Portal-based RS	Comparison w. Local AQ Monitoring	Monitoring Module	Decision Support Module	Smart City Module	Policy Eval. & AQ Planning w. local Authorities
Barcelona, ES - *Large EU*	✓			✓	✓	✓	✓	✓
Copenhagen, DK - *Med. EU*	✓			✓	✓	✓	✓	✓
Lucerne, CH - *Small EFTA*	✓		✓	✓	✓	✓		✓
Thessaloniki, GR - *Med. EU*	✓			✓	✓	✓		✓
Nanjing, China - *Large Asia*		✓		✓	✓	✓		✓
Hong Kong - *Large Asia*		✓	✓	✓	✓	✓		✓

Figure 3: Overview of City Demonstrations and Locations

1.3.3. Positioning of ORESTIN

ORESTIN will focus on innovative approaches to advancing technological development of the existing RS technologies which are mainly used for research projects and trials, and are not commercially available. Although there is no new unproven singular concept planned to be developed during the project, all the three RS systems will receive substantial improvements in terms of accuracy, applicability, and training. The cloud-based data platform will be structured so that it is transferable, interoperable, and scalable for the data collected and integrated in this project, so new data can be created and included in the future. The following table shows the technology readiness levels of the technologies and innovation elements before and after ORESTIN.

Technology / Innovation Element	Technology Readiness Level (TRL)	
	Before	After
Roadside-based RS Device (Opus-RSE)	TRL5	TRL7
Chasing Vehicle RS System (City University of Hong Kong)	TRL4	TRL5
Portal Based RS Device (HEAT-EDAR)	TRL4	TRL4*
Interoperable Decision Support & Monitoring Platform	TRL3	TRL6

***: *Although EDAR technology will not be technologically developed in ORESTIN, adding the technology to review and analyse in the project ensures that all available types of RS technologies are assessed and benchmarked systematically, innovative ideas are cross-fertilised, and recommendations for future improvement benefit the RS technology as a whole*.**

1.3.4. National and international research and innovation activities linked with ORESTIN

Roadside remote sensing: USA program; County programs in EU; Colorado and Virginia study (running)
Relevance to ORESTIN: OPUS's Roadside-based RSD technology has been used for decades in the USA to complement Inspection/Maintenance (I/M) programs in the identification of high emitting vehicles. The US EPA acknowledged it for other general applications (identification of low emitting vehicles and general vehicle and I/M program evaluation) with guidance documents for state I/M program administrations. The technology has also been used in different programs in Europe for many years, e.g. UK, Denmark, Switzerland, Spain, France, Austria, Sweden and many more. Hundreds of thousands of remote sensing measurements have been collected so far. OPUS RSDs are currently deployed in large numbers in the USA (e.g., ~20 each day in Colorado and Virginia), providing large databases of millions of real-world emissions measurements annually. CONOX has pooled approximately 750,000 remote-sensing measurements covering a wide range of driving conditions, ambient conditions, and vehicle models built to conform to several generations of Euro standards. ORESTIN will make use of the results of the above-mentioned studies, aiming at the parameters that describe more in detail the high emitting groups. Priority will be given to these groups as well as to country/location particularities identified in the EU studies. **Common Partners: Opus RSE, Systech, UnivLeeds**
Portals over the road path: EDAR Birmingham and London project (2015); CONOX, funded by Swiss EPA
Measurements with suspended monitoring devices (EDAR system) above the street took place for a month in Birmingham and London areas (as well as in Scotland in 2017). The survey was completed by continuous emission sampling which resulted to thousands of valid measurements. The analysis of the data showed, amongst other findings, that the stricter EC vehicle emissions certification standards have resulted in higher in-use NOx emissions. ORESTIN will comparatively evaluate the existing results with ultraviolet/infrared-based technologies and report the potential benefits of a wide application of laser sensing technologies. ORESTIN will thoroughly review the findings from CONOX and conduct in-depth analysis of fleet-wide emissions performance produced by the EDAR system used in the project. **Common Partners: UnivLeeds (and also its subcontractor – Emissions Consulting)**
Chasing vehicles: On-road Plume Chasing and Analysis System (OPCAS), ECF/01/2012, ECF/22/2015
OPCAS developed City University of Hong Kong has been used to develop a mobile air sensor network in Hong Kong for sustainable AQ management and cost-effective traffic control, and to investigate primary PM and NOx emissions from on-road vehicles and their effect on roadside AQ. ORESTIN will make use of OPCAS to collect the fleet-based emission factors and detailed analyse the impact vehicle age, engine size, immanence conditions on the emission factors. The results can be readily used to provide data reference and technical improvement experience for the proposed project. **Common Partners: HKC**
Data infrastructure: AUTOPILOT (H2020); EUSysFlex (H2020); CLARUS (H2020)
AUTOPILOT and EUSysFlex deal with various data collection issues: AUTOPILOT deals with data from various sources including vehicles, sensors, roadside stations and IoT services while EUSysFlex deals with heterogeneous data from the Energy sector. These assets will be used to build a comprehensive and agile data platform in ORESTIN. Also, CLARUS deals with the data privacy strategies for cloud-based applications. Data protection strategies will be extended and scaled to ORESTIN needs. **Common Partners: AKKA, UnivLeeds**
AQ and traffic management: inLUFT (Swiss EPA); MFM-U (Swiss EPA); RePort (EMO/1882/2015, 2016-2018); CERTH mobility centre (2007-present)
inLUFT and MFM-U are two projects which have been in operation for the past 15 years focused on monitoring AQ across central Switzerland with a heavy focus on the impacts of traffic on AQ, especially in regard to freight transport across the Alps and AQ within Swiss Cities. ORESTIN will be able to leverage these project's robust measurement station network, which are directly operated by inNET, thus providing the consortium with 15 years of historical and near real-time traffic and AQ data throughout the duration of the ORESTIN project which can be easily integrated within the ORESTIN platform city demonstrations.

RePort is focussed on reducing the emissions from the HDVs that operate in the Port of Barcelona through the implementation of dual-fuel engines. ORESTIN will benefit from real-world driving emissions data and its application to AQ modelling to assess the impact of replacing the current vehicles with new technologies.

CERTH manages and operates the smart mobility living lab of Thessaloniki area. Real time traffic data for all modes of transport are collected from multiple sources (traffic management centres, IoT devices, floating car data, crowed sourced data etc.) and fused with historical data bases (vehicle registration, fleet composition data etc.) for supporting planning and operational activities. This lab will be an input source in ORESTIN regarding traffic emissions, fleet composition and traffic planning of a Southeast EU country.

Common Partners: inNET, CERTH, BSC

Related to local air quality plans: Barcelona low emission zone; ZUDK (Central Switzerland Air Pollution Control Action Plan); City of Luzern (Action Plan for Air, Energy, Climate)

Barcelona city has recently implemented a city-centre access regulation that will progressively become more restrictive especially during air pollution episodes. ORESTIN will study the effectiveness of such countermeasures and implement the best practises in the proposed Action Plans. The Barcelona project will also be a pool of local authorities and stakeholders to be involved in the ORESTIN working groups.

As a Swiss leader in AQ monitoring and management, inNET has worked with cities and regional authorities over the past decade to build their local AQ Action Plans for both the region of Central Switzerland and the City of Lucerne. Learnings from these Action Plan development projects will be incorporated in ORESTIN in order to provide guidance on how best to collaborate with local authorities as well leverage these close relationships for continued development of the Action Plans to reflect the advancements made by ORESTIN.

Common Partners: BSC, inNET

Enforcement actions: Cerl'Air (Swiss Society for AQ Professionals)

Recently in Switzerland, the Swiss Society for AQ Professionals have one of their key work groups focused on Emissions from Engines and Trade. Although formal results are minimal at this stage, many of the Cantonal representatives in the group have begun working with Highway Police Officers to enforce obvious instances of HDV tampering within key trans-continental highways spanning through Switzerland. These preliminary experiences with enforcing tampering laws will be built upon within the ORESTIN project, especially in regard to how to incorporate RS as an alternative and improved upon method for identifying high-emitters.

Common Partners: inNET

1.3.5. Gender Aspects and Considerations

The consortium acknowledges the "gender issue" as stated in the EU regulation 1291/2013 as of 11 December 2013 establishing Horizon 2020. The ORESTIN partnership is committed to encouraging equal opportunities of career among women and men in their staff according to national and European laws and corporate ethical code. ORESTIN addresses women's needs, as much as men's needs. ORESTIN will constantly monitor the gender level of participation within the project activities.

1.4. Ambition

1.4.1. Advance beyond the State of the Art (SoA)

Several of the Consortium partners are already leaders of the State of the Art in their respective fields of expertise, in particular OPUS for Roadside RSDs, HKC for Chasing Vehicles, AKKA for data platform infrastructure, inNET for AQ monitoring networks, BSC for AQ modelling and plans, and UnivLeeds for mathematical and statistical data analysis and traffic simulation.

SoA-1: Technological development of roadside remote sensing

State-of-the-art: RSDs have been used for vehicle emissions monitoring and individual vehicle screening in research projects or trials. Due to high costs, RSDs today are produced in very few numbers and in batch assemblies where the component costs are spread over small quantities. One of the operational issues of RSDs is data management. These devices acquire a massive amount of data per unit of time, which must be properly managed for emissions processing, cross with traffic databases, emissions analysis, and subsequent reporting.

ORESTIN progress beyond the SoA: ORESTIN will explore a set of potential innovative solutions such as redesign and modernization of the principle components to suit semi-permanent installation; incorporation of improved light sources and detectors to improve the accuracy of an individual measurement; and multiple meas-

urements of the vehicle emissions to capture better overall characterization of the exhaust. These new developments are expected to produce RSDs which are smaller, less obtrusive, and less discernible by the driver. Also, ORESTIN will produce better data acquisition and management for the operation of RSDs.

SoA-2: Technological development of chasing vehicle

State-of-the-art: OPCAS has monitored over 20,000 vehicles in Hong Kong via a Chasing Vehicle technique. The preliminary investigations have also demonstrated its capability in large fleet emission diagnosis and individual high emitter identifications. However, the high-level requirement of expertise in its operation makes it difficult as an effective tool for national and local enforcement authorities to implement.

ORESTIN progress beyond the SoA: The OPCAS will be further developed into a compact OPCAS-II system which is a robust air monitoring platform that includes hardware and software systems for use to produce large amounts of emissions data on individual vehicles in a more easy-to-use manner.

SoA-3: Creation of data infrastructure

State-of-the-art: Smart City data infrastructure has seen tremendous progress in the recent years notably with the impulse of IoT based systems. Specific recent achievements can be seen in the current H2020 bIoTope project (Project ID: 688203) that focuses on Standardized Open APIs for enabling horizontal interoperability between data silos. A Proof-of-Concept on "Smart AQ Services" has been developed notably using Open Data Format (O-DF) and Open Messaging Interface (O-MI) standards. This Proof-of-Concept primarily results in a specific mobile phone application (MOTIDE) for citizens wanting to be notified on pollutants/allergens exposure in specific areas. These recent achievements demonstrate a strong existing baseline, but only limited to some datasets and not covering all data reference cited in the methodology. In addition to this, experiments have been conducted in 2017 by GSMA and the Royal Borough of Greenwich in London on AQ data mixed with weather observation data for more in-depth AQ assessment and forecasting but this does not include correlations with the traffic management systems.

ORESTIN progress beyond the SoA: Further development is thus necessary through ORESTIN notably on the interoperability issues to ingest a wider variety of datasets and also including real-time data collection and processing for smarter management of AQ and traffic. The key advancements of on-road Roadside RSDs and Chasing Vehicles systems, price performance and improved methods of effective application, will be achieved through the advanced analytics that will be enabled by the new data infrastructure.

SoA-4: Creation of an integrated policy evaluation and decision support tool

State-of-the-art: Air Quality Action Plans contain a comprehensive series of measures that will help improve air quality and work towards achieving the national objectives for many air pollutants that road vehicles emit. The development of these plans typically involves the quantification of the source contributions responsible for the exceedance of the relevant objective, and the impacts of the proposed measures. This is normally done by using air quality modelling statistics rather than integrated real data from vehicles, traffic management systems, and air quality monitoring stations.

ORESTIN progress beyond the SoA: ORESTIN will integrate these previously disconnected components into a holistic AQ Management System for Smart Cities while also making a notable improvement to each individual component, especially the RSDs price performance and the appropriate methods of their useful application. Furthermore, the advancements to the underlying data platform and AQ models will be achieved through building out an easily-replicable and interoperable cloud-based platform which can integrate the many different data streams, including newly deployed RS monitoring equipment, which together are necessary for creating the next generation of Smart AQ Decision Support Platforms.

1.4.2. Innovation potential

Our consortium believes that the development and implementation of ORESTIN's next generation Smart AQ Decision Support Platform and RSD improvements can become a key asset for the future of Sustainable Smart Cities. Through leveraging the near real-time data and RS information of the air pollution profile of the entire fleet (including individual infringing vehicles), city authorities will have the ability to truly optimize the intersection of traffic and AQ in ways never before possible. Furthermore, improved RS equipment and methods will enable a more wide-scale adoption and thus, facilitate the automated ticketing of infringing vehicles based on exceeding emission regulation limits - similar to automatically sending a ticket to their home just like many cities currently do already for regular traffic rule infringement like speeding or running red-lights. The most innovative thing the ORESTIN platform could enable in the future, is to build the foundation for autonomously controlling intelligent traffic management systems based on actual high-resolution air pollution levels, such as the real-time banning of certain vehicle types from low emission city centres, potentially re-routing traffic to parts of the city

which are better able to handle the pollution load, or even enable the ability to charge fluctuating 'toll' fees to drivers based on the emissions profile of their vehicle and the air pollution conditions of their real-time location (i.e. higher driver 'toll' fees on days which have high-levels of pollution using a tax-optimized 'pay-to-pollute' approach).

In addition to the innovative enforcement and policy evaluation techniques described above, the ORESTIN project will enable new businesses models and further commercialization opportunities for the consortium's SMEs as they continue to support cities in the operation and management of the ORESTIN platform and RSDs. Due to its innovative Platform-as-a-Service design, the entire ORESTIN system can be easily replicated and deployed in new Smart Cities, enabling the consortium's SME's to commercialize the ORESTIN products and services well beyond the demonstration cities.

2. Impact

ORESTIN is expected to have multiple impacts in certain thematic areas in Europe and abroad. The reduction of the environmental pollution and consequently the improvement in quality of life in the urban areas are the most noticeable contribution to society and the economy. The project is also aiming at further development of emission measuring technologies and platforms that can be applied without excessive effort. Additionally, ORESTIN will contribute to the drafting of targeted EU regulations and implementation strategies/plans locally and beyond. The expected impacts of ORESTIN that will be monitored through specified KPIs as described below.

Expected Impact 1: *Reduction of emissions from the existing combustion-engined car fleet*
The ORESTIN solutions will allow the characterization of different vehicle categories using real-life data, in the sense of clustering pollutant emitters based on engine capacity, fuel type, year of construction, chassis type and passing by speed. Appropriate countermeasures that will suit each group will be proposed. Furthermore, the consortium will not limit itself to recommendation on technical parameters, but it will look further to driver related aspects such as driving style, vehicle tampering and poor maintenance. ORESTIN aims to identify more accurately inappropriate driving behaviour (e.g. via chasing vehicle), investigate the causing factors and propose plausible and short-term actions that might lead up to 10% emission reduction due to driver style adaptation. This action should take place in conjunction with the projects of sub-Topic A to ensure that the results of ORESTIN not only support AQ plans and enforcement authorities, but also provide reliable evidence to awareness campaigns and driver training. **KPIs**: **4 policy** recommendation **plans** for reduction of emissions from cars, vans, PTWs & trucks based on **15-30**% reduction targets of NO_2 and PM_{10} from high emitters
Expected Impact 2: *Reduction of transport-related emissions though the improvements of detection and enforcement against vehicles with tampering, defeat devices or durability issue*
By applying the improved ORESTIN RSDs techniques and Decision Support Platform, cities will be able to detect and enforce infringing vehicles to make the necessary improvements/repairs to reduce infringing vehicle's emissions to more appropriate levels. In support to the sensing technologies, the dedicated data infrastructure will be able to host real-time data collection and stream processing in order to automatically detect emission-related anomalies and send appropriate alarms to the traffic authorities, setting up the infrastructure for automated enforcement and ticketing of infringing vehicles similar to a speeding ticket. **KPIs**: Significant improvements made to existing RS detection equipment; identification of more than **20%** high emitters in at least 1 European Demo City; **1** pan-European plan for emission enforcement.
Expected Impact 3: *Better understanding of the impact of the different transport modes through monitoring detection and modelling of emissions in the existing road vehicle fleet*
The efficacy of most of the low emission traffic policies implemented during the last years in European cities has proved to be limited and slightly clear. ORESTIN will properly combine the data and knowledge derived from RSDs with the adequate technology and tools in order to support policy makers toward the definition of more effective plans. The dedicated data infrastructure will embed specific Big Data analytics that will facilitate impact assessment on the different transport modes and will provide structured data for emission scenario and AQ modelling activities. Extrapolation of the results derived from the demo sites will depict the benefits of vehicle emission reduction on a macro level in Europe.

KPIs: At least **50 policy makers** around Europe involved; at least **3 traffic emission strategies** evaluated in European Demo Cities; **1 international training event** for professionals on the roadside emission measurement techniques; **4 evaluated policy scenarios** based on improved modelling of existing road fleet leading in order to identify solutions for 15-30% reduction targets of transport related NO_2 and PM_{10}.

Expected Impact 4: *Provide technical evidence to assess gaps in current regulation of vehicles and AQ*

The extensive real-life data collection in different EU and Asian cities using more than one method for determining the emission concentrations will provide insights on the effectiveness of vehicle emission regulation, not only by Euro classification but also looking at vehicle age and the level of exceedance of the emitted gasses in comparison to type approval limits. The data will also confirm the potential effectiveness of combined technologies such as hybrid powertrains with diesels engines for NOx reduction instead of a diesel engine. ORESTIN will look at all vehicle categories operating in an urban environment (passenger cars, LDV, HDV, Buses, and PTWs).

KPIs: Engagement of at least **20 experts** from the automotive industry during **2 workshops** with the participation of ACEA, ACEM, CLEPA, and the Commission representatives to discuss the mid-term and final outcomes of the project; identification of the top **3 regulation gaps** reported in **1 individual report per vehicle type** (in total **5**).

Expected Impact 5 (additional to the program): *Int. cooperation is encouraged, in particular with China*

ORESTIN echoes the EU's ambition of international collaboration through our creation of a worldwide platform for sharing and exchanging innovative solutions, experience and best practices for emission monitoring, data analytics, AQ plans and enforcement. By doing so, ORESTIN will position the EU at the hub of global RS research activities via bilateral cooperation with both Asia and North America. This will greatly benefit the EU both as a potential receptor of new concepts and solutions from other parts of the world, and as a provider of existing practices already applied in European cities that are transferable into other contexts.

Our group of international collaborators include: Hong Kong city, Nanjing city, and the United States Environmental Protection Agency's National Vehicle and Fuel Emissions Lab. This laboratory collaboration is very fortunate for ORESTIN efforts since it was responsible for much of the ground-breaking work on vehicle tampering and RS techniques. Due to this collaboration, some of their US-EPA's distinguished engineers, including Carl Fulper, will join ORESTIN's advisory board.

KPIs: **6 exchange visits** from consortium experts; **1 journal article** and **2 conference papers** per partner as outcome of the project; development of **2 teaching modules** (one for Masters students and one simplified for Under Graduates) on vehicle emissions monitoring, **2 international technical workshops**.

Expected Impact 6 (additional to the program): *Any other relevant contributions to the UN's Sustainable Development Goals (SDG), in particular SDG 3 ("Ensure healthy lives and promote wellbeing for all at all ages") and 11 ("Make cities and human settlements inclusive, safe, resilient and sustainable"*

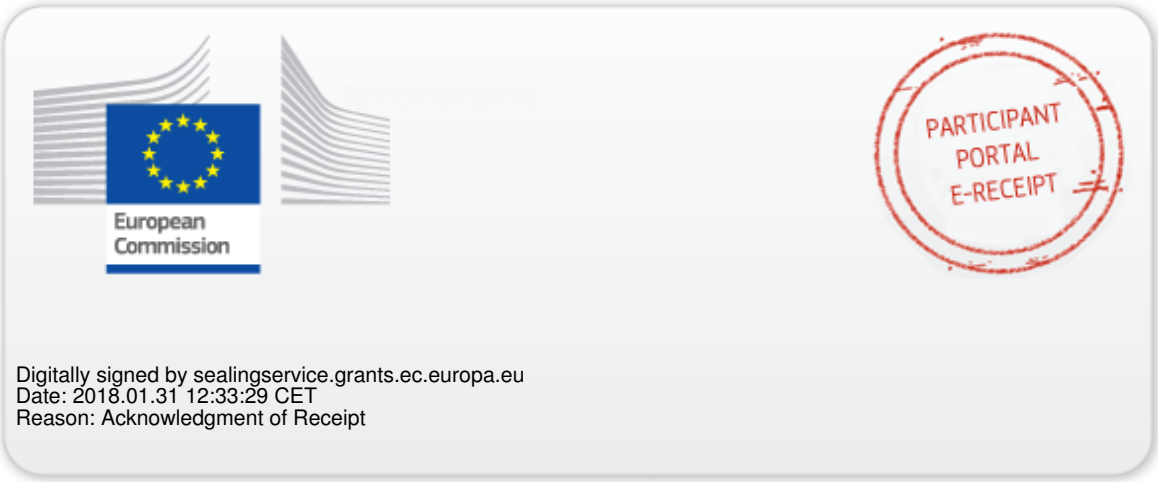
ORESTIN will significantly impact the ability of cities to be better prepared to manage their AQ, ultimately leading our project to contribute to achieving SDGs 3 and 11, which are both focused on minimizing air pollution exposure to people, especially people within cities. Through the ORESTIN's work and detailed measurement of each partner city's AQ situation within the Decision Support Platform, we will be able to directly link our project's impacts to SDG Indicator 3.9.1: *Mortality rate attributed to ambient air pollution* as well as to SDG Indicator 11.6.2: *Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)*. Each one of these indicators will directly be reported within the Decision Support & Monitoring Platform and be included in every simulation of different policy options.

KPIs: **15%** reduction in annual **PM** by end of project in at least **2 European Demo Cities emission plans**.

Expected Impact 7 (additional to the program): *To support modelling, simulation and assessment of low-emission traffic management schemes, and local AQ control and enforcement solutions*

ORESTIN will collect real tailpipe emissions data and vehicle operational characteristics (e.g. speed, acceleration, power) simultaneously. This data can be used to calibrate instantaneous speed-based and power-based emission models (e.g. PHEM, Swiss EMPA, MOVES) which have been coupled with microscopic traffic models (e.g. AIMSUN, PARAMICS and VISSIM) to provide detailed inputs to air dispersion models such as ADMS for investigating air pollution problems due to vehicles and roads.

KPIs: UnivLeeds will allocate **3 Masters students** (at no cost to the EU), as part of their programmes, to carry out dissertation topics in this area.



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