Milestone 8 – Pilot planning

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CONTROL SHEET

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Terms and abbreviations

Term / Abbreviation	Definition
ABS	Anti-lock/skid Braking System
ADR	European Agreement concerning the international carriage of Dangerous goods by Road
AWV	Agentschap Wegen en Verkeer (Agency for Roads and Traffic)
bPVD	basic PVD
CAM	Cooperative Awareness Message
C-ITS	Cooperative ITS
CMT	Core Management Team
DENM	Decentralized Environmental Notification Message
DITCM	Dutch Integrated Testsite Cooperative Mobility
EC	European Commission
ePVD	extended PVD
ESP	Electronic Stability Programme
ETA	Expected Time of Arrival
GA	Grant Agreement or General Assembly
GLOSA	Green Light Optimized Speed Advisory
HE	Highways England
INEA	Innovation and Networks Executive Agency
ITS	Intelligent Transport Systems
IVS	In Vehicle Signage
KCC	Kent County Council
MCTO	Multimodal Cargo Transport Optimization
MS	Member State
MTM	Motorway Traffic Management
NDW	National Data Warehouse
OBU	On Board Unit
OEM	Original Equipment Manufacturer
PKI	Public Key Infrastructure
PO	Project Officer
PVD	Probe Vehicle Data
RSU	Road Side Unit
RWW	Road Works Warning
TEN-T	Trans-European Transport Networks
TfL	Transport for London
TMS	Traffic Management System
TMS	Traffic Management System
VMS	Variable Message Sign

1 Executive summary

Sub-Activity 3.1 "*Definition of Pilot operation framework and KPI*" has the objective to define a framework to carry out the pilot operation in a consistent way in the four Member States (MS) Belgium, France, Netherlands and the United Kingdom.

The present document details the pilot planning for each of the four MS giving the following information:

- Presentation of pilot sites

Description where services are deployed, maps, typical traffic conditions

- User support procedures

Who are the users/service, what has the user to do to access the service (user manual)

- Stakeholders

Description of who is involved in the pilot: Road operators, service providers, users, suppliers, traffic management centres, etc.

- Specific operational constraints

Description of known constraints, e.g. cross border service continuity

- Provision of data for services and evaluation

Description of the data (How and by whom is data collected) that will be provided by the pilot as input to InterCor Activity 4

- Pilot configuration to roll out

What is going to be active in the pilot, e.g. number of RSUs, number of OBU equipped cars, etc.

- Timeline/service

Dates for procurement phase and pilot start date (per service, if already known)

- Risk analysis per pilot

List of already identified risks

The final version of the present document is the deliverable to Milestone 8 due on 31st of August 2017.

2 Introduction

2.1 Purpose of this document

The purpose of the document is the definition of the pilot planning per MS with the objective of achieving a timely start of the pilot operation on the 31st of May 2018.

2.2 InterCor Contractual References

InterCor (Interoperable Corridors) links the C-ITS corridor initiatives of the Netherlands C-ITS Corridor Netherlands-Germany-Austria and the French one defined in SCOOP@F, and extending to the United Kingdom and Belgium C-ITS initiatives.

InterCor is an action co-financed by the European Union under the Grant Agreement number INEA/CEF/TRAN/M2015/1143833. The Project duration is 36 months, effective from the 1st of September 2016 until the 31st of August 2019. It is a contract with the Innovation and Networks Executive Agency (INEA), under the powers delegated by the European Commission.

3 Intended audience

All partners involved in the roll out of the InterCor pilot sites.

4 Definition of pilot planning – Belgium/Flanders

4.1 Presentation of pilot sites

Figure 1: Overall view, Belgian pilot site

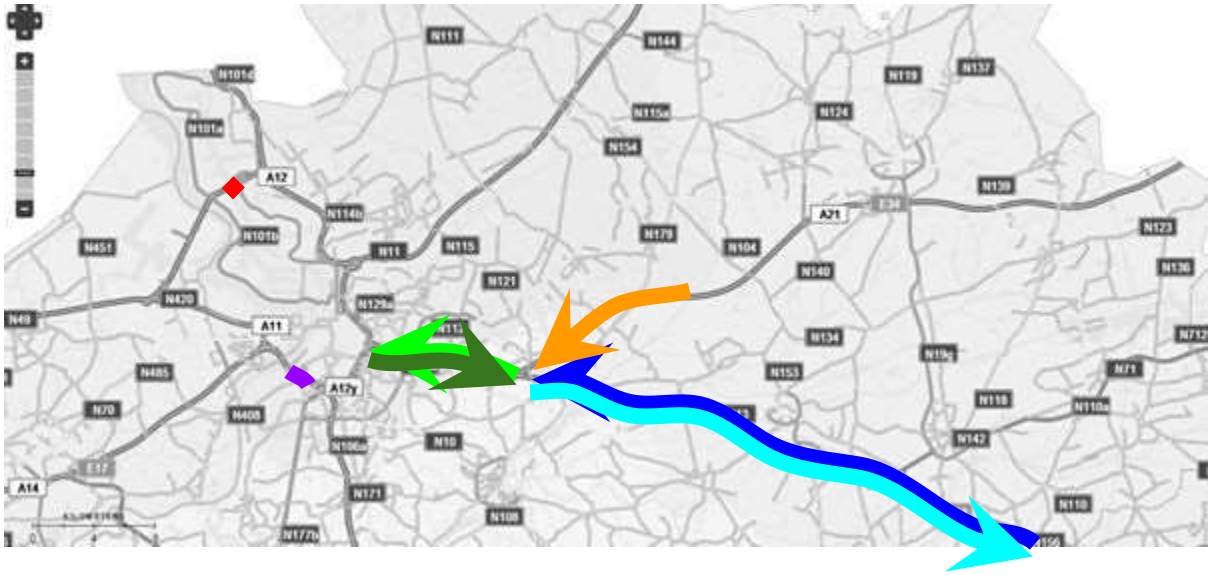

Figure 2: Detailed view, Belgian pilot site

a. E34 Vorselaar > Ranst (orange stretch in Figure 2)

- Road segment currently equipped with 10 cabinets with inductive loops and 4 roadside variable message signs
- 2 lanes and a fixed bus-lane
- Length: about 15 km
- Traffic volume: 25.000-29.000 vehicles/working day

b. E313 Ranst > Antwerpen-Oost (yellow stretch in Figure 2)

- 3 lanes and a dynamically managed bus-lane
- Length: 10 km
- Road segment currently equipped with 13 cabinets with inductive loops and dynamic speed limit and lane indicator signs and 2 variable message signs (text)
- Traffic volume: 64.000-78.000 vehicles/working day

c. Antwerpen-Oost > E313 Ranst (green stretch in Figure 2)

- 3 lanes and a lane for hard shoulder running
- Road segment currently equipped with 10 cabinets with inductive loops and dynamic speed limit and lane indicator signs and 1 variable message sign (text)
- Length: 10 km
- Traffic volume: 70.000-83.000 vehicles/working day

d. E313 Beringen > Ranst (blue stretch in Figure 2)

- 2 lanes and a fixed bus-lane
- Road segment currently equipped with 40 cabinets with inductive loops and dynamic speed limit and lane indicator signs and 4 roadside variable message signs
- Length: 45 km
- Traffic volume: 33.000-36.000 vehicles/working day

e. E313 Ranst > Beringen (light blue stretch in Figure 2)

- 2 lanes
- Roadside Variable Message signs planned for Q3/2018
- Length: 45 km
- Traffic volume: 33.000-35.000 vehicles/working day

f. R1, Kennedytunnel and/or **R2, Tijsmanstunnel**

- Kennedytunnel: 75.000-82.000 vehicles/working day/direction (of which 17.000 lorries)
- Tijsmanstunnel: 19.000-21.000 vehicles/working day/direction (of which 7.000-8000 lorries)

g. potentially: (parts of) R1 and E19 (A1), both driving directions

subject to agreement on a 'Cross Border test site' for Connected & Automated Driving (cfr. Rome LoI)

- Ring Road (4-6 lanes)
- Motorway (2-3 lanes) connecting Antwerp and Rotterdam

4.2 User support procedures

The following C-ITS services will be provided:

1. Road Works Warning (RWW), specifically for mobile road works
2. In Vehicle Speed limits
3. Tunnel Surveillance (ADR-transport use case)

Which users:

1. Test vehicles
2. Road operator, in the tunnel surveillance case

4.3 Stakeholders

The following stakeholders are identified:

- Agentschap Wegen en Verkeer (AWV, Agency for Roads and Traffic (and tunnel operator))
- Departement Mobiliteit en Openbare Werken
- Vlaams Verkeerscentrum (Flemish Traffic Centre)
- Be-Mobile (Citrus-partner)
- HERE (C-Roads-partner)

The following stakeholders are to be decided:

- Service provider(s)
- Suppliers
- Partners for evaluation

4.4 Specific operational constraints

Cross-border continuity of services is an important constraint.

Interoperability (security/services).

4.5 Provision of data for services and evaluation

The following data for the services will be provided:

- Real time speed limit information, according to the current dynamic speed limits
- Real-time locations of road works signalisation-vehicles

The data needed for evaluation will be provided in line with data requirements defined by Activity 4.

4.6 Pilot configuration to roll out

BE/Flanders will set up a software platform to provide the services over ITS-G5 and mobile data. The aim is to equip about 50 vehicles with OBU's (tablet / smartphones / application) and about 25 road side cabinets with ITS-G5 equipment. The PKI-infrastructure is still to be decided upon.

4.7 Timeline/service

Deadlines from Activity 2.1a-d for stable version/

- Apr 2017 - Oct 2017: planning + preparation of procurement
- Nov 2017 - Apr 2018: procurement
- Apr 2018 - Sept 2018: study + deployment
- Oct 2018 - Aug 2019: Pilot Start / Operation

4.8 Risk analysis per pilot

Problems with procurement phase. Undecided / unclear specifications.

5 Definition of pilot planning – France

5.1 Presentation of pilot sites

The French pilot aims at extending the SCOOP@F coverage from Paris towards the North. It is entirely included in the TEN-T Core Network. It includes the A1 motorway up to Lille and the A22 motorway between Lille and the Belgian border. An extension is made from Lille towards Dunkirk and Calais through the A25 and A16. A pilot will be setup in the Northern France region between Dunkirk, Calais and Boulogne-sur-Mer sea ports, the Eurotunnel site near Calais, as well as the multimodal platforms in the Lille and Dourges region. This region has dense and high-volume traffic hotspots especially for transports of goods. Most of these hotspots are directly on the TEN-T North Sea-Mediterranean Corridor, some on the extension (Dunkirk) and most on the E40/A16 motorway. In addition, to ensure the continuity of services between A1 and the roads equipped within SCOOP@F, additional sections ‘'la Francilienne'' of the Paris outer ring road will be equipped in this project. As the main crossing point from the continent to the UK and on the North Sea range, the region is a very important international road transit and will be ideal for a testing cross-border C-ITS interoperability. The roll out and coordination of this pilot will be led by a regional innovation and competence centre (TTP/i-Trans) as the main logistics players and sites are in their network. The pilot is to focus on freight services, with possible safety related services that

can be added. A map of the road network and information on traffic volumes are shown here below.

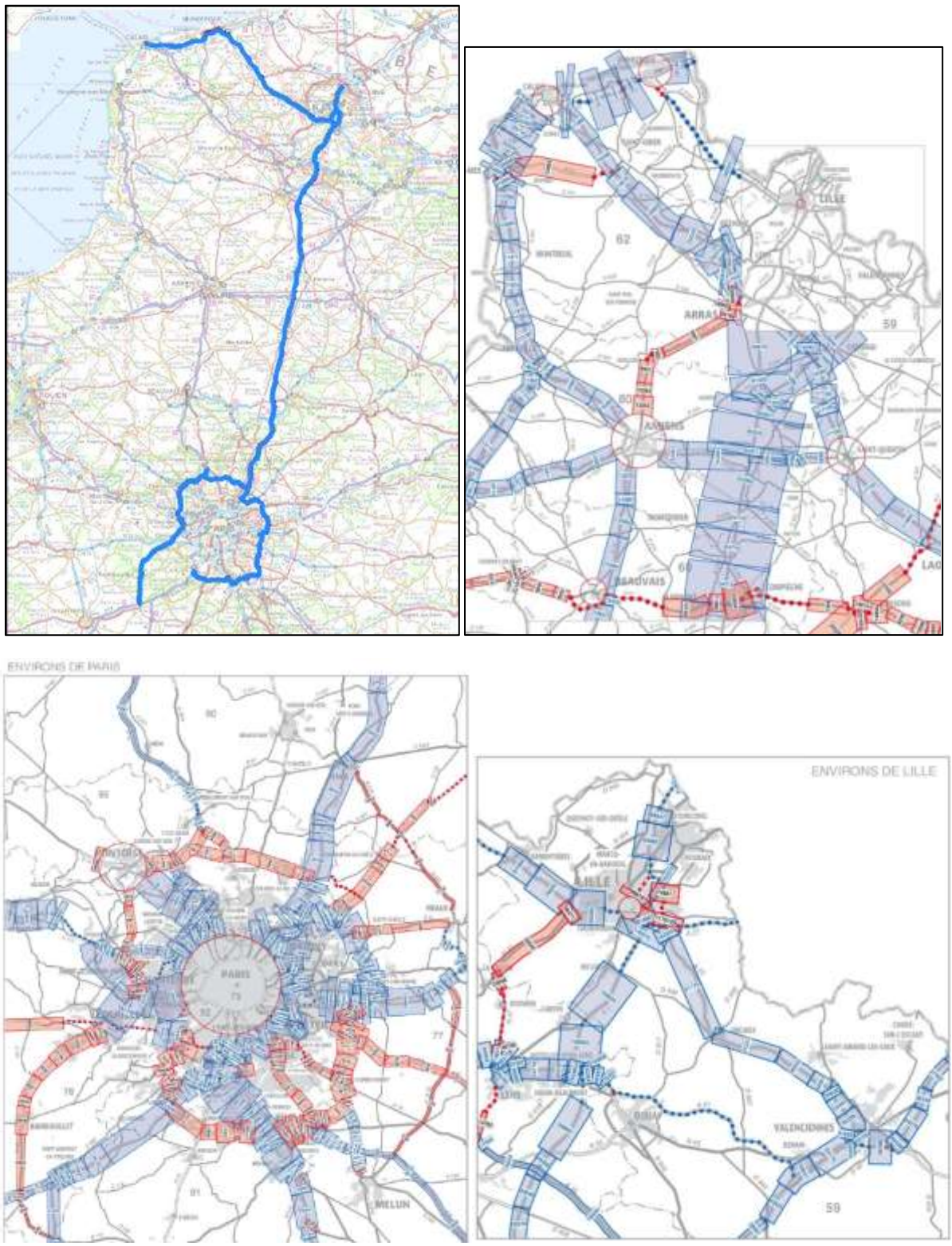

Figure 3: French pilot sites

5.2 User support procedures

There are three types of users, each with their own support manual:

- The customers of PSA and Renault, for the SCOOP@F existing services,
- the truck drivers, for the new freight services,
- the road operators.

5.3 Stakeholders

Road operators: DIRN, DiRIF, Sanef

Traffic management centres:

- DIRN : ALLEGRO enables the dynamic management of road traffic on 150kilometers of urban highways in the metropolitan area of Lille. It's a powerful tool which is able to measure in real time the conditions of traffic. With 70 variable message signs, 140 cameras and 150 traffic sensors, ALLEGRO includes strategies for event information, travel time information, dynamic regulation of speeds and access.
- DiRIF operates on 600km of urban highways and 22 tunnels in the region Ile-de-France. Traffic management is achieved in 4 traffic management centres, each one in charge of a geographical area, and a central centre at regional level, with a centralised traffic management system called Sirius. 800 cameras and 6000 traffic sensors send information to Sirius giving a dynamic view of traffic conditions and events on the network and allowing for the elaboration of strategies for the road information (events, travel time) displayed on 300 variable message signs and dynamic access regulation.
- Sanef: the Traffic Control Centre located in Senlis ensures the dynamic management of the 800 km of the Sanef North motorway network. It includes the 165 km of the conceded part of A1 motorway from Paris to Lille. AMELIE is the software package that has been developed by Sanef IT department to collect traffic data and manage incidents and road works. Traffic data is collected through loop detectors, Bluetooth sensors and video cameras. Information is broadcast to the driver via Sanef 107.7 traffic information radio, variable message signs, www.sanef.com internet web site and smartphone applications "Circulez malin" and "Sanef 107.7". A partnership with Waze has been signed in 2016 to allow real time exchange of traffic information for the benefit of the driver.

Service providers:

- Car manufacturers : PSA and Renault for the SCOOP@F vehicles
- Geolocsystems, MGI for the freight services (NOSCIFEL platform)

Users: see section 0.

Suppliers: not yet known, to be designated through the procurement process.

5.4 Specific operational constraints

Backwards compatibility with the 3000 SCOOP@F vehicles is a heavy operational constraint. Cross-border continuity of services is an important constraint as well. Maintaining operation during road works is a key constraint for the detailed planning of roll-out.

5.5 Provision of data for services and evaluation

Data for services are provided by three sources:

- Road operators (road works, events, etc.)
- Users' vehicles (speed, events etc.)
- Ports and logistics platforms (information about the access to the port/platform)

Data needed for evaluation will be defined in Activity 4, as well as the corresponding communication protocols and the repositories for these data.

5.6 Pilot configuration to roll out

The components of the system are the following:

- RSUs
- OBUs : PSA/Renault (SCOOP@F vehicles), trucks, road operators' vehicles
- SCOOP@F/InterCor platform
- NOSCIFEL platform
- Home agent/national platform for cellular
- PKI

5.7 Timeline/service

Deadlines from Act 2.1a-d for stable version

- Procurement: 9 months (tender for both development of prototypes and roll-out)
- Development of prototypes, validation: 9 months
- Roll-out, evaluation: 1 year

5.8 Risk analysis per pilot

See Risk Register updated from proposal part D.

6 Definition of pilot planning – The Netherlands

6.1 Presentation of pilot sites

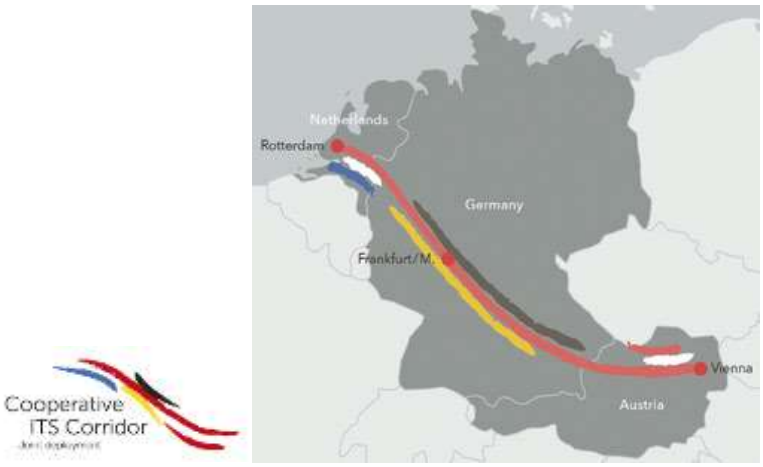

Figure 4: The Cooperative ITS Corridor: The Netherlands – Germany – Austria

The Dutch pilot is part of the national policy of innovation and transition to rely more and more on C-ITS, including private initiatives. It covers 268 km of motorways and some other roads. It aims to roll out and operate a number of day 1 and day 1,5 services. After preparation, testing and pre-deployment, services will be operational in 2018 and 2019. ITS-G5 roadside units will be deployed and a number of services will be using existing cellular communication, while also hybrid solutions are foreseen using both communication channels.

To provide the services, roadside units will be installed along important parts and on specific spots of the road network. The roadside units are connected with a central unit, exchanging real live data. Roadside units may be mobile or fixed. Fixed roadside units will be linked to existing roadside systems e.g. to the gantries of the existing MTM-system on motorways. Mobile roadside units will be fitted to safety trailers, used by road operators during road works. For a number of services cellular communication will be used, in combination with ITS-G5 communication (hybrid solution) or cellular only.

Location

The pilot area is situated in the south of the Netherlands (see Figure 5). The area consists of the TEN-T core network road section Europoort Rotterdam – Belgian border (motorway A15-A16) and the section Belgian border – Eindhoven – Venlo, motorway A67. To connect these two TEN-T core network sections and have a meaningful corridor to roll out the proposed services, the road section Breda – Eindhoven (A58, A2) has been added. Also a core

network section of the A2 near Utrecht, around the Leidsche Rijn Tunnel is added. The total network stretches out for 268 km of which 60 km or 22% is comprehensive network.

Services

The services Road Works Warning (RWW), Probe Vehicle Data (PVD) and In Vehicle Signage (IVS) will be tested and implemented in the pilot area. The services RWW and IVS will be realized, not only by ITS-G5 communication, but also by cellular communication and/or by a combination of both types of communication. On several locations in the Province of Noord-Brabant (around Eindhoven and Helmond) the service Green Light Optimal Speed Advice (GLOSA) will be implemented, also using both types of communication (hybrid solution).

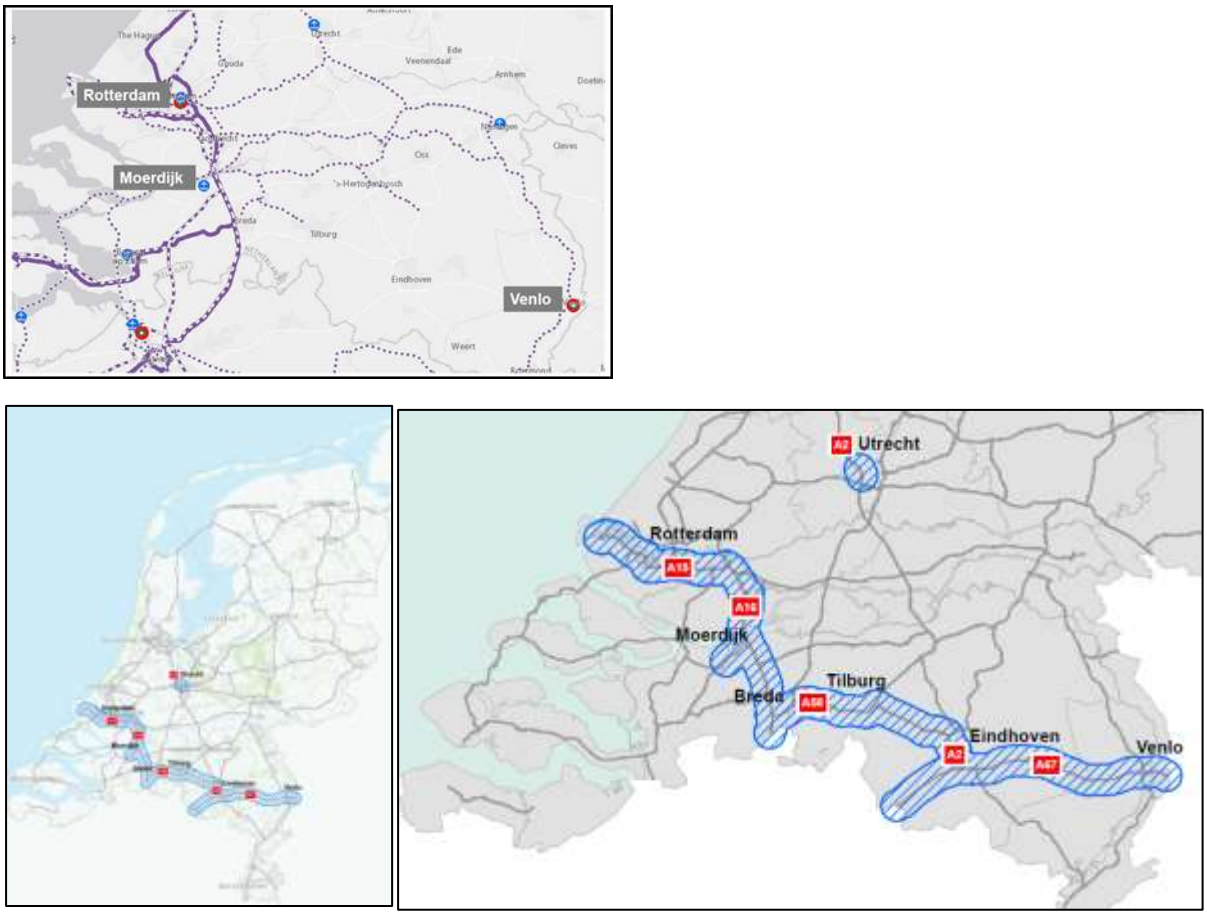

Figure 5: Dutch pilot area, mostly situated in the south of the Netherlands

Four use cases of the logistic service MCTO (Multimodal Cargo Transport Optimization) will be tested and implemented. The first use case is meant to give logistic hubs a more accurate estimated time of arrival of the trucks via cellular communication.

The second use case will be tested near the Leidsche Rijn tunnel on motorway A2. Every day a lot of heavy vehicles come and go to FloraHolland, a place where flowers are being auctioned. FloraHolland is located in a short distance to the south of Schiphol. Most heavy vehicles leave FloraHolland, go south to motorway A2 via regional road N201 or motorway A9 and pass the Leidsche Rijn tunnel in motorway A2 near Utrecht. It is for safety reasons not allowed to have traffic jams in this tunnel. If there is a risk that there will be a traffic jam in the tunnel (e.g. caused by an accident downstream the tunnel) tunnel operators will close a lane, so fewer vehicles can drive into the tunnel. This measurement causes traffic jams at the A2 in the direction of the tunnel. Often, these traffic jams grow until the junction N201-A2. In this case drivers of heavy vehicles will be advised by Variable Message Signs (VMS's) at FloraHolland and in-car information to take another, faster route to get to the other side of the tunnel.

Alternatively, if the regularly routes via regional road N201 or motorway A9 are available and faster than other routes (e.g. due to traffic jams), drivers of heavy vehicles will be advised by VMS's at FloraHolland in-car information to take the N201 or A9 to the south.

In addition to this use case, eight traffic lights at the N201 (FloraHolland → A2) are being transformed to iTLCs within the Talking Traffic Program. These eight intelligent traffic lights will provide traffic light information to this service and drivers of dedicated heavy vehicles will receive in-car traffic light information, such as time to green. In the case that the fastest route is recommended via the N201 (due to traffic jams on more common routes), dedicated heavy vehicles will get, if possible, balanced priority at traffic lights to limit the hindrance of the extra heavy vehicles breaking and accelerating at the N201. This is the third logistic use case.

In the fourth use case terminal operators at logistic hubs will provide available timeslots for (un)loading trucks at docks to a data access point.

Approach

The pilot activities in the Netherlands can be seen as a growing process from first trials in 2016 to full pilot operation in 2018/2019. In order to work in a 'learning by doing' way, an iterative process is used. This process starts with preparing and carrying out small pilots or tests, which are followed by evaluation. After considering the lessons learned from the evaluations, a new cycle of preparing, carrying out and evaluating can start. In this way for the use-cases, which are relatively mature, the first small pilots started already in 2016. Knowledge and experience from these first pilots is used for adapting first specifications, so that these can be used for the next cycle of carrying out pilots.

In 2016 first activities on the road started, regarding RWW (mobile solution) and PVD with ITS-G5 communication. In March 2017 this was followed by first trials with RWW and IVS (fixed roadside units) on motorway A16 south of Rotterdam. Taking into account the experience from the first activities, this site was extended, in order to be able to organize the interoperability TESTFEST on services, using ITS-G5 communication (RWW, IVS and PVD), in July 2017. After the TESTFEST, when results of the interoperability testing are available, these results will be used for a further extension of this pilot (see also table 1).

In parallel RWW and IVS services are developed, using cellular communication. They are expected to be operational in the first months of 2018. Then, these can be added to the pilot of the services with ITS-G5 communication.

Pilot activities will consist of two phases. Phase one is expected to be operational direct from the beginning of 2018 till September 2018 with the equipped infrastructure and vehicle fleets. A second phase is planned to be operational in 2019. The GLOSA pilot in Phase 1 is situated along the main road that runs through Helmond which will be equipped with 29 hybrid road side units.

The two logistic use cases, Optimal Route Advice and balanced priority for dedicated vehicles,, will be provided as one service for drivers of heavy vehicles. The development of this service will take about a year and will be fully operational in June 2018.

ETA services have been tested in several pilots throughout the Netherlands in 2015 and 2016 (ECT in the harbour of Rotterdam and Simacan Control Tower for Albert Heijn). Further implementation of these services can be achieved by identifying logistics hubs and transporters that make use of the InterCor network. The next step within Intecor will be the provision of timeslots by the terminal operators. Implementation is expected in the first half of 2018.

The information on the pilot planning in the Netherlands is summarized in Table 1.

Table 1 Overview of pilot activities in the Netherlands

Use Case	Pilot description
Roadworks Warning ITS-G5 communication, mobile solution with safety trailer; November 2016	- Pilot on motorway A16, south of Rotterdam (complicated road lay-out with fly-overs and parallel carriageways); - Roadworks with one lane closed on the right side, secured by a road safety trailer; - Regular traffic conditions, roadworks only between 10:00 and 15:00 (in peak hours no roadworks allowed); - Road safety trailer equipped with RSU and communication to a back-office; - RSU on road safety trailer sending a warning (DENM) via ITS-G5 to the approaching traffic;

Use Case	Pilot description
	- Two equipped test vehicles driving on this stretch of road continuously between 10:00 and 15:00, to receive the warning; - Analysis of all logged data to determine the performance.
Probe Vehicle Data December 2016	- Pilot on motorway A58, between Tilburg and Eindhoven; - 35 RSUs with communication to a back-office; - 50-100 equipped vehicles (ITS-G5 and cellular communication); - Vehicles equipped with ITS-G5 sending CAMs to the RSUs; - Comparison of the data from the vehicles with data from the loop detectors; - Analysis of all logged data to determine the technical performance.
Roadworks Warning / In-vehicle Signage March 2017	- Pilot on motorway A16, south of Rotterdam (complicated road lay-out with fly-overs and parallel carriageways); - Regular traffic conditions, roadworks only between 10:00 and 15:00 (in peak hours no roadworks allowed); - Situation with real roadworks; - 5 fixed RSUs on gantries connected to a back-office; - RSUs sending two types of messages via ITS-G5: DENMs to indicate the position of the roadworks (RWW) and IVI to indicate the information on the variable message signs on the gantries (IVS - variable speeds or red crosses); - Three equipped test vehicles driving on this stretch of road continuously between 10:00 and 15:00, to receive the warnings; - Analysis of all logged data to determine the performance.
TESTFEST Roadworks warning, In-vehicle Signage, Probe Vehicle Data July 2017	- Tests on the parking near a maintenance station and on motorway A16, near Dordrecht, south of Rotterdam (complicated road lay-out with fly-overs and parallel carriageways); - Regular traffic conditions, roadworks only between 10:00 and 15:00 (in peak hours no roadworks allowed); - Situation with real roadworks; - 17 fixed RSUs on gantries and a fully automatic connection to a back-office; - RSUs sending two types of messages via ITS-G5: DENMs to indicate the position of the roadworks (RWW) and IVI to indicate the information on the variable message signs on the gantries (IVS - variable speeds or red crosses); - Three equipped test vehicles from Rijkswaterstaat driving on this stretch of road continuously between 10:00 and 15:00, to receive the warnings; - Interoperability testing with OBUs from partners in the InterCor project; - Interoperability testing with OBUs from C-ROADS partners, Car-2-Car Communication Consortium members and others who want to participate. - Analysis of all logged data to determine the performance.
Roadworks warning, In-vehicle signage, Probe Vehicle Data June 2018-August 2019	- Pilot on motorway A16 / A58 / A2 / A67; - Pilot with ITS-G5 Communication and cellular communication; - RWW and IVS, using cellular communication in the total pilot area; - Fixed, as well as mobile RSUs, enabling ITS-G5 communication; ➢20 fixed RSUs on motorway A16 Rotterdam – Belgian border; - Three types of messages via ITS-G5: DENMs to indicate the position of the roadworks (RWW), IVI to indicate the information on the variable message signs on the gantries (IVS - variable speeds or red crosses) and CAMs (data sent by the vehicles); - Secured messages; - A number of vehicles equipped with OBUs, in order to be able to evaluate the services; - Regular traffic conditions; - Situations with real roadworks; - Analysis of all logged data to determine the performance; - Experience from the previous pilots and TESTFESTs will be taken into account to set up the pilot.
GLOSA	- Pilot on main road through Helmond; - Pilot with ITS-G5 Communication and cellular communication; - 20 fixed RSUs on main road through Helmond;

Use Case	Pilot description
	- A number of vehicles equipped with OBUs, in order to be able to evaluate the services; - Regular traffic conditions; - Analysis of all logged data to determine the performance; - Experience from the previous pilots and TESTFESTs will be taken into account to set up the pilot.
Optimal Route Advice and Balanced priority for dedicated vehicles	- Pilot with cellular communication - A number of heavy vehicles equipped with an application on a smartphone - A fleet will be recruited among carriers operating at FloraHolland. In addition, synergies with the Talking Traffic vehicle fleet will be attempted - Regular traffic conditions, including situations with real traffic jams - intelligent traffic lights (GLOSA) at the N201 between FloraHolland and the motorway A2 - A platform where real time traffic information and iTLC information is available - VMS's at FloraHolland
ETA and Dock Reservation	- Identifying logistics hubs along the InterCor network in the Netherlands and choose 3 potential logistic companies for logistics services; - The service provider gives information about real-time traffic information and expected time of arrival to participating logistics hubs. - Terminal operators at logistic hubs provide available timeslots for (un)loading trucks at docks to a data access point. - Transport planners use this service to assign routes and docks to trucks. - Regular traffic conditions; - Analysis of all logged data to determine the performance.

6.2 User support procedures

In order to be able to evaluate the services with ITS-G5 communication a limited fleet of vehicles with on board units is foreseen. To evaluate the RWW and IVS services with ITS communication on the A16 Rotterdam – Belgian border, this could be e.g. a number of heavy vehicles equipped with on-board units from a transport company, providing regular services between the harbour of Rotterdam and the harbour of Antwerp. The drivers of these vehicles will be informed about the on-board units and services, however the use of the equipment and services should be largely self-explaining and requirements from the perspective of 'human factors' should be taken into account. This is as important for the services with cellular communication and is even more important for those cellular services, like RWW and GLOSA, which will be made publicly available.

Requirements from the perspective of 'human factors' concern[1]:

- Timely presentation: information should be presented on time, not too late or too early;
- Priority by context and urgency: messages should be prioritised by their importance to the driver in relation to the context, with the most urgent (safety related) information

[1] See also: Human Factors requirements and recommendations for the Road Works Warning (RWW) use case on the C-ITS Corridor, Rijkswaterstaat, 3 March 2016

being prioritized;
- Ambiguity and validity: information presented is non-ambiguous, valid and reliable for a road user;
- Visual attention: the information provided should not lead to glances that exceed 2 seconds eyes-off-the-road;
- Recognition and consistency: the service should use existing local traffic symbols and signs;
- Reliability: The service does not provide false alarms or misses;
- Physical interaction: the service should not require any control input from the driver while driving;
- Visual display position: the display should always be fixed to the car, within reach of the driver, while not blocking the view on the road;
- Visual information presentation: visual information should be visible and legible;
- Auditory information presentation: auditory information should be audible and properly combined with visual information presentation.

6.3 Stakeholders

Responsible for realizing the pilots are:
- The Ministry of Infrastructure and the Environment, leading the programme 'Talking Traffic', in which the private sector is stimulated to develop services based on cellular communication.
- Rijkswaterstaat, the road operator of the Dutch national road network, in the InterCor project mainly focusing on the deployment of the ITS-G5 services RWW, IVS and PVD, but also contributing to the realization of logistic services.
- The Province of Noord-Brabant with the road operator, Municipality of Helmond, in InterCor mainly working on the pilot for GLOSA.
- The Province of Utrecht, the road operator of the regional roads in this part of the Netherlands, in InterCor focusing on the pilot with optimal route advice and balanced priority for dedicated vehicles.

Research institutes, consultants and suppliers are involved in the preparation and operation of the pilots in relation to:
- design and engineering (specifications, profiling within standards);
- data collection, storage and distribution (National Data Warehouse, NDW);
- data communications (ITS-G5 equipment);
- telecommunications (networking roadside – back-office, road safety trailer – back-office

communication);
- road maintenance (safe pilot operations on the road);
- system integration (linking several subsystems and ensure the performance of the services);
- OEM automotive and after-market service providers (OBU equipped vehicles);
- evaluation.

Also DITCM and Connekt as the round tables of knowledge institutes, industry and government are involved.

6.4 Specific operational constraints

Rather general constraints concern:
- applicable laws and other regulation;
- applicable international agreements regarding C-ITS;
- applicable national agreements and policy regarding C-ITS;
- existing, operational traffic management systems;
- available human resources (quantity and quality);
- current contracts of the road operators;
- requirements regarding security;
- requirements regarding privacy;
- budgets.

More specific constraints concern the organization of the pilots in the Netherlands. The Dutch pilot activities build on activities on the Cooperative ITS Corridor and a number of national activities. These activities have their own objectives, timelines and governance structure. The activities and the InterCor project are aligned and there is continuous coordination between InterCor and these initiatives. However, given the specific objectives of the initiatives, the extent to which they can adapt to the InterCor project has certain limits.

Furthermore, it is good to stress that the pilots take place in real live traffic, with incidents, accidents and congestion. In this context executing the pilots will not always be the first priority of road operators. Regular traffic management operations will be leading, when executing the pilots.

6.5 Provision of data for services and evaluation

Data needed for evaluation will be defined in Activity 4 of the InterCor project, as well as the corresponding communication protocols and the repositories for these data.

6.6 Pilot configuration to roll out

Warning (RWW), In Vehicle Signage(IVS), Probe Vehicle Data (PVD), GLOSA and Multmodal Cargo Transport Optimization. The first three services will be tested in the ITS-Corridor pilot. The ITS-Corridor network is part of the InterCor Network. An initial test will be done during the first TESTFEST on the A16 in the Dordrecht area.

For **RWW** the process will contain the following steps:
The warnings are transmitted using a secure short-range ITS-G5 connection (also known as WiFi-P) and the 3G/4G mobile telephone network. Roadside Units (RSU's) transmit information such as the exact location of the road works and the available lanes to passing vehicles equipped with WiFi receivers. There are two data streams:
Data stream 1: Roadside units send data such as the location of the road works to the traffic information centre. This information is made available to service providers who offer related services to drivers over the mobile network. This service is provided using the "connected track".
Data stream 2: From the roadside, the G5 technology is used to send road works information directly to vehicles fitted with compatible receivers.

For **IVS** the process contains several steps:
The traffic management system (TMS) is triggered by an external trigger that dynamic signalling is activated. The dynamic signalling system along the highway is used to block lanes and reduce speed limits dynamically. At the same time, the TMS sends messages towards a CU to trigger RSUs to send ITS messages (IVI). Also a trigger is send from TMS to data providers on real-time dynamic traffic signals. The CU converts the TCC trigger to the relevant ITS message (IVI) and forwards this to a RSU. The RSU broadcasts the same message during the requested duration time with a specific repetition rate to OBU.
The data provider combines the data feed from TMS, and possibly others, and provides that to the service provider.
The service provider determines whether an IVS message is required for the individual user, and sends the appropriate information to the smart phone (or any other Internet connected in-vehicle system). In the vehicle, the message of the OBU is forwarded to the application on the smartphone. The smartphone determines based on the input from and what to put on the HMI, and shows the warning, if required.

For **PVD** the process contains the following:
PVD will collect all relevant ITS-G5 messages (e.g. CAM [REF], DENM [REF]) sent from V-ITS-Ss from passing vehicles within the communication range of the R-ITS-Ss. These messages contain information like the vehicle's position, speed, direction, etc. In the future (other) messages might contain information about the car's sensors as well, like windscreen wiper status, ABS, ESP, emissions, etc.

From the implementation point of view, there are 2 use cases which are functionally more or less the same, but with different service levels (i.e. difference in coverage and topicality).
• [basic Probe Vehicle Data, bPVD] The locations of R-ITS-S do not fully cover the road network. Standard messages from V-ITS-Ss are only received when in range of a R-ITS-S.
• [extended Probe Vehicle Data, ePVD] The locations of R-ITS-Ss are the same as in 1 and vehicles are equipped with a function which stores the (broadcasted) messages or the information they contain. In this case the R-ITS-S sends requests to V-ITS-Ss when in communication range. V-ITS-Ss receiving this request will then send the stored messages/information. By this mechanism, information originating outside the communication range of the R-ITS-Ss can be obtained.

For the pilot operation, regarding RWW, IVS and PVD, using ITS-G5 communication the following equipment is foreseen:

- ITS-G5 RSU's (fixed solutions) – >20 units, multi-vendor;
- ITS-G5 RSU's (mobile solution) – around 2-4 units, multi-vendor;
- safety trailers for road maintenance (mobile solutions) – around 1-3 units;
- central unit for generating and/or processing required DENM, CAM, IVI messages;
- interfaces with several existing subsystems (data collections);
- OBU's, preferably both OEM (if available) and after-market – around 2-10 multi-vendor;
- test and validation/verification tooling.

For the pilot operation, regarding GLOSA the following is foreseen:

- Pilot on main road through Helmond;
- Pilot with ITS-G5 Communication and cellular communication;
- > 20 fixed RSUs on main road through Helmond;
- A number of vehicles equipped with OBUs, in order to be able to evaluate the services;
- Regular traffic conditions;
- Analysis of all logged data to determine the performance;

For the pilot operation, regarding Multimodal Cargo Transport Optimization, using cellular communication the following equipment is foreseen:

- Heavy vehicles equipped with an application on a smartphone
- A platform where real time traffic information and iTLC information is available
- 8 intelligent traffic lights at the N201 between FloraHolland and the motorway A2
- VMS's at FloraHolland

Regarding the logistic service use case Truck ETA the following configuration is foreseen:

- Travel time measurement systems within trucks -> multiple, multi-vendor;
- Data access point(s)
- An occupancy measurement system for docks at logistic hubs -> one per hub, multi-vendor
- Interfaces with existing planning systems and fleet management systems at the logistics companies.

6.7 Timeline/service

- RWW, IVS, PVD: extension of the test environment for the TESTFEST, pilot operational (ITS-G5 and cellular) June 2018;
- GLOSA: Pilot activities will consist of two phases. Phase one is expected to be operational direct from the beginning of 2018 till September 2018 with the equipped infrastructure and vehicle fleets. A second phase is planned to be operational in 2019.
- Logistic services regarding the use cases Optimal Route Advice and Balanced priority for dedicated vehicles: Procurement phase from September 2017 until May 2018. Pilot operational from June 2018 until August 2019
- Logistic Services regarding the use cases ETA and Dock reservation are expected to be implemented in June 2018.

6.8 Risk analysis per pilot

The InterCor Risk management methods and procedures are described in chapter 6.3 of the Grant Agreement. For the individual pilot sites within the Netherlands, separate risk analyses have been or will be made.

Risks that can be identified are:

- Insufficient support for the pilots from policy and/or management level
- Insufficient agreement on interoperable specifications
- Security issues
- Privacy issues

- Delay in procurement procedures
- Necessary stakeholders insufficiently interested
- Differences in the timelines/priorities of underlying projects contributing to the pilots.

7 Definition of pilot planning – United Kingdom

7.1 Presentation of pilot sites

The A2M2 Corridor provides a combination of many types of road from urban tunnels, motorways through to rural dual carriageways and forms an important link from London to the rest of Europe. This unique mixture of roads makes it a good choice for testing connected vehicles.

The inclusion of the A2 within London offers a unique opportunity to consider how connected vehicle technology can operate in a city and provides the potential for end-to-end journeys from London to Dover. The location of the pilot can be seen in Figure 6 to Figure 8 below.

Phase 1 - Delivery of up to 4 km of continuous ITS-G5 wireless access infrastructure. Prototype system and services to test and evaluate the infrastructure before wider deployment of P1,2 & 3. To LTE deployment in P1 trial area.

Phase 1a - Delivery of up to 17 km of continuous ITS-G5 wireless access infrastructure LTE deployment in P1 &P1a area.

Phase 2 -. Delivery of up to 54 km of continuous ITS-G5 wireless access infrastructure and LTE deployment in P2 trial area combining with the TfL and Kent trial areas.

Phase 3 - Trial P2 plus 54 km of continuous ITS-G5 wireless access infrastructure LTE deployment in the Phase 3 area plus extension of LTE from M2/A2/A299 junction along the A2 down to Dover Interconnectivity (Core2Core aspect) with other EU C-ITS corridors, i.e. Intercor, SCOOP@F.

Figure 6: Overall view, UK pilot sites

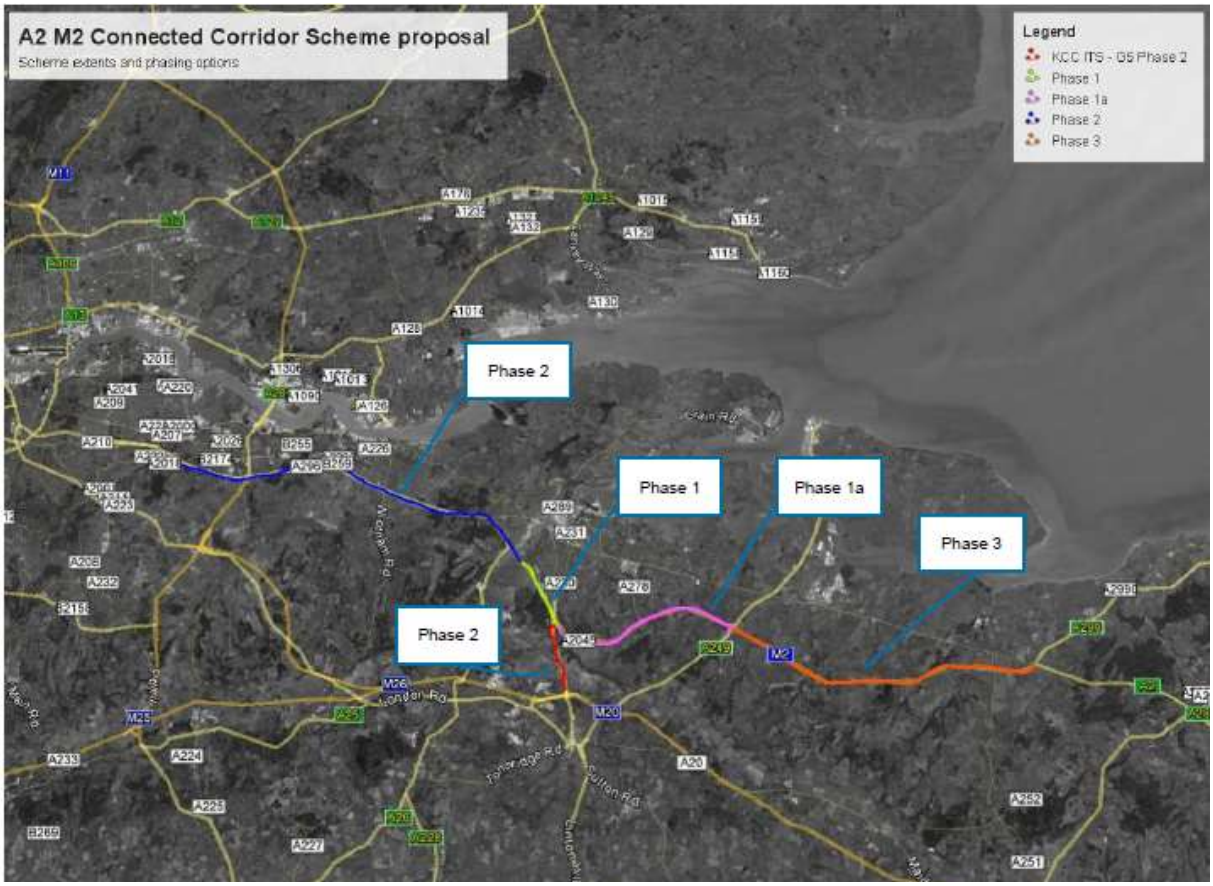

Figure 7: Roll out phases, UK pilot site

Figure 8: Detailed view, UK pilot site

Pilot implementation of the Day 1 services is shared between the three road operator partners (Highways England (HE), Transport for London (TfL) and Kent County Council (KCC)) and this is set out below. Day 1.5 services are still under discussion.

The following pilot C-ITS services will be implemented and evaluated on the corridor:

- Floating Point Data
- Green Light Optimised Speed Advisory
- In Vehicle Signage
- Road Works Warning

Kent County Council proposes to use the A229-Bluebell Hill to deploy the C-ITS services. The route branches off of the M2 at Junction 3 forming a dual carriageway connection to the M20 Junction 6. It includes a series of interurban signalised roundabouts and terminates in the centre of Maidstone own Centre at the Bridge Gyratory where four major arterial routes converge in an urban, bridge constrained environment.

Highways England proposes to deploy C-ITS services to parts of the M2, with an ambition to expand this to the A2 should this be successful. The section is representative of the UK's strategic road network. This is a diversionary route for the TEN-T M20 between Dover and the M25. This deployment is subject to satisfactory structural surveys.

Traffic conditions on this route are heavier over elongated peaks. The route is subject to higher than average volumes when there are issues on the Strategic Route Network, where vehicles will divert from one motorway to the other. This includes incidents and times when channel port restrictions are in place.

Transport for London proposes to use the A2 and A102 to deploy and test the pilot C-ITS services.

7.2 User support procedures

Initially the users will comprise a selection of vehicles, some of which supplied by a fleet of Local Highway Authority service vehicles. Further extension to the fleet of vehicles/on board units will be dependent on ongoing procurement exercises as will be the training for accessing services.

7.3 Stakeholders

Kent County Council (KCC)

- KCC Highway Management Centre
- Local Borough Councils/Authorities:

  - Dartford Borough
  - Gravesham Borough
  - Medway Council
  - Swale Borough
  - Canterbury City
  - Dover District
- Technical Environmental Services Contractor (TESC)
- KCC ITS Maintenance Contractor
- Freight Transport Association & supplementary partners (TBC).
- A282 Dartford Crossing Partners.
- Channel Ports. (Dover Port & Channel Tunnel Operators)
- Kent Police
- Highways England (HE)
  - HE Control Centre
  - HE Area Team (Area 4)
  - HE Asset Support Contractor
  - Other relevant contractors (IT)?
  - HE Top 20 stakeholders
- Transport for London (TfL)
  - TfL Planned Interventions, Road Space Management Directorate
  - TfL Operations, Road Space Management Directorate
  - TfL Outcomes Delivery, Road Space Management Directorate
  - TfL Asset Management Directorate
  - TfL Technology & Data, Customer Experience
  - London Boroughs

7.4 Specific operational constraints

KCC envisage no operational constraints on its route.

Condition of pre-existing assets need to be reviewed by HE.

TfL will be piloting the four Day 1 services via cellular communication only, there is currently no proposal to install new assets on street, and there is therefore no need to coordinate the implementation of the pilot services with other work. However, cellular coverage will need to be assessed, to ensure that it is adequate for the pilot.

Prior to and throughout the pilot operational period, when the impact of the services is being assessed, there will be regular engagement with key stakeholders (see section 2.3) to

ensure that activities are coordinated with planned maintenance works on and around the A2/A102 and the Blackwall tunnel, and that ad-hoc incidents/ events are recorded, for future reference.

7.5 Provision of data for services and evaluation

All partners have data collection and dissemination capability, but decision has yet to been made on how data will be collected for evaluation. The possibility of collecting of data in a central data warehouse for all partners is under investigation.

TfL will use existing back-office systems and interfaces will be developed to provide the data that will be required for the pilot services. The data will be made available to third party service providers via a web interface. The third party suppliers will be commissioned, through a joint procurement exercise run on behalf of the four UK programme partners, to provide services to end-users via on board units (OBUs).

7.6 Pilot configuration to roll out

The current intention is to let two hardware procurement exercises. The first will be for provision of telecommunications (i.e. ITS-G5) and the second for provision of everything necessary to deliver services to vehicles/on board units.

7.7 Timeline / service

Outline design phase for the pilot is underway with detailed design and procurement to follow in 2018. The pilot is unlikely to start before October 2018, although UK partners are examining ways that this could be accelerated, and whether there is the potential for a further phased introduction of some pilot services prior to this date.

7.8 Risk analysis per pilot

There are no major risks to implementation of the pilot, but current risks that may impact on timescales of the pilot are procurement timelines, condition of the existing assets and agreements on data management.

