

TESTFEST ITS-G5

2nd Webinar

1 June 2017



Moderator

Peter Schmitting

Activity Leader InterCor TESTFESTs (ERTICO)

Speakers

Axel Zandbergen

Rijkswaterstaat, Test manager of the Dutch part of the Cooperative ITS Corridor project, hosting the InterCor G5 TESTFEST

**Peter-Paul
Schackmann**

Activity Leader InterCor Pilot roll-out Preparation



Notes about Webinar moderation

- All participants are muted during presentation
- Participants can “Ask questions”
 - Use the control panel to write your question during the presentation
 - Ideally refer to a slide number in your question
 - The moderator will review your question during the webinar
- Webinar will be recorded
- Recorded Webinar will be posted on the InterCor website

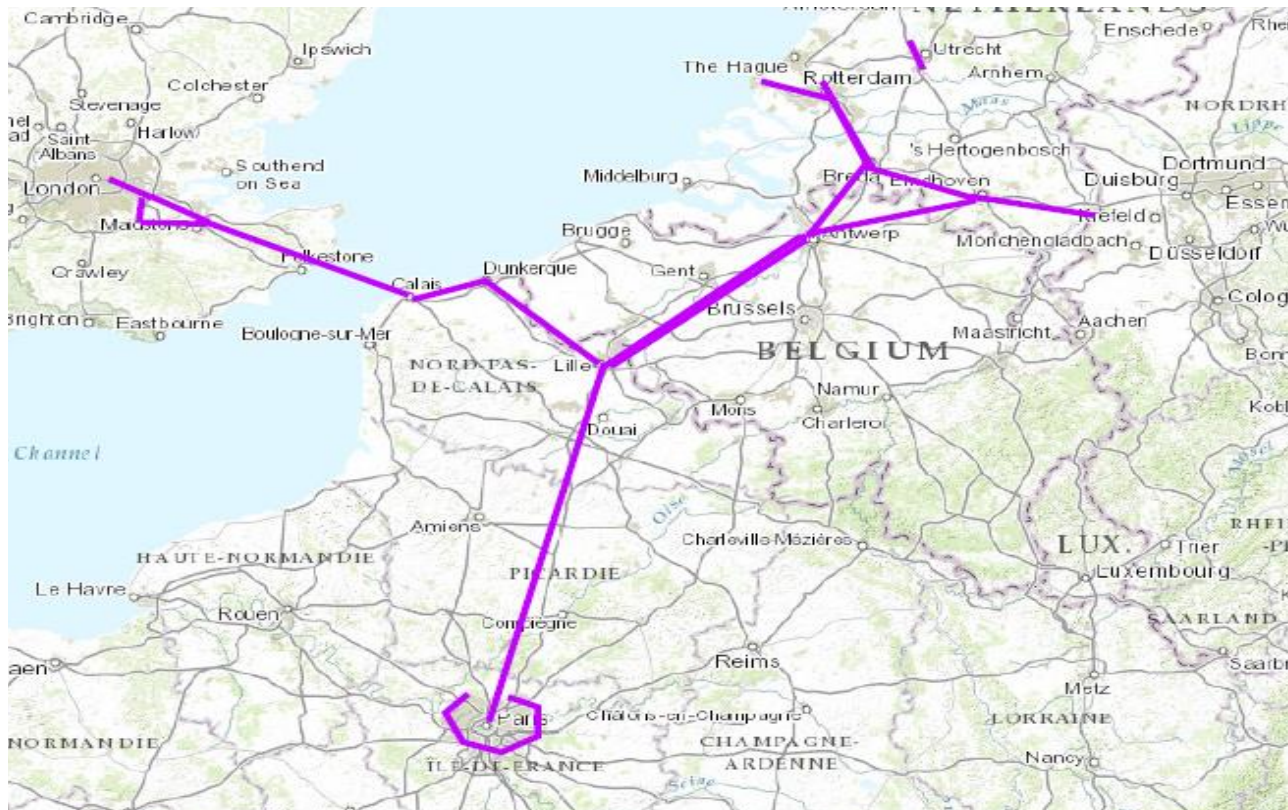


1. Introduction to InterCor (Peter Schmitting)
2. TESTFEST ITS-G5 preconditions (Peter Schmitting)
3. Specification Baseline (Axel Zandbergen)
4. Field Test en Test track (Axel Zandbergen)
5. Test scenarios (Axel Zandbergen)
6. Test protocol (Peter Paul Schackmann)
7. Data logging (Peter Paul Schackmann)
8. Follow-up (Peter Schmitting)



InterCor (1) InterCor introduction (i)

InterCor is a study of 1530 km of four member states under the TEN-T Core road network connecting from the North Sea – Mediterranean to the Arc Atlantique Corridor.



Schedule international interoperability events

4 TESTFEST events planned before the start of Pilot Operations

- ITS-G5 Services RWW, IVS, PVD
July 3 – 6, 2017, The Netherlands
- Hybrid communications (ITS-G5 + Cellular)
Services RWW, IVS, PVD, GLOSA
Q4/2017, The Netherlands or UK
- PKI: Services RWW, IVS, PVD, GLOSA
Q1/2018, France
- Logistics services:
Services Truck parking, cargo and tunnel logistics
Q2/2018, Belgium

Start Pilot Operations May 31, 2018



InterCor (1) InterCor Introduction(iii)

TESTFEST ITS-G5 objective

The objective of the first InterCor TESTFEST is to validate the interoperability of existing ITS-G5 services based on the common set of specifications developed in the InterCor project

- Main goal: Ensure roll out of interoperable C-ITS services
- Focus on service interoperability, not product interoperability
- Achieved by testing on board user devices from different vendors/countries against installed Road Side Units in a given set of test scenarios



Services to be tested

Service	Message format	Comments
Road Works Warning (RWW)	DENM	Will be tested during live road works and also continuously available as Virtual RWW
In Vehicle Signage (IVS)	IVI	Continuously available, during live road works as well.
Probe Vehicle Data (PVD)	CAM	Probe data based on CAM aggregation
<i>Collision Risk Warning (CRW)</i>	<i>DENM</i>	<i>Additional C-ITS Corridor scope, not an InterCor service!</i>

Table: available services at the test site, InterCor services highlighted

(2) TESTFEST Preconditions (i)

By participating in the TESTFEST, participants explicitly agree with the following rules and instructions

1. Attendance at the safety instruction session is mandatory for all participants. A safety instruction session is scheduled each TESTFEST day, before actual testing. You will be denied access to the TESTFEST when you have not attended the safety instruction session.
2. Dutch law and Dutch traffic signs and regulations in the Netherlands are applicable.
3. Rijkswaterstaat is not liable for any damage due to reduced availability of the ITS-G5 services and/or the test track for whatever reason.
4. Participants are to follow up instructions from safety managers, road side inspectors and duty officers at all times.
5. The Test Centre will be accessible for registered participants only.
6. Please note that videos and/or pictures can be shot during the TESTFEST for InterCor and Rijkswaterstaat P.R. purposes.



InterCor (3) Specification Baseline (i)

Baseline for the 1st InterCor TESTFEST

- Dutch implementation of InterCor specifications:
 - C-ITS Corridor Profile 3.0
- Test Scenarios
 - in Plan of Action
- Logging format
- (PCAPs and XMLs, will follow later)

Documents will be available for participants from 2 June on the InterCor website.



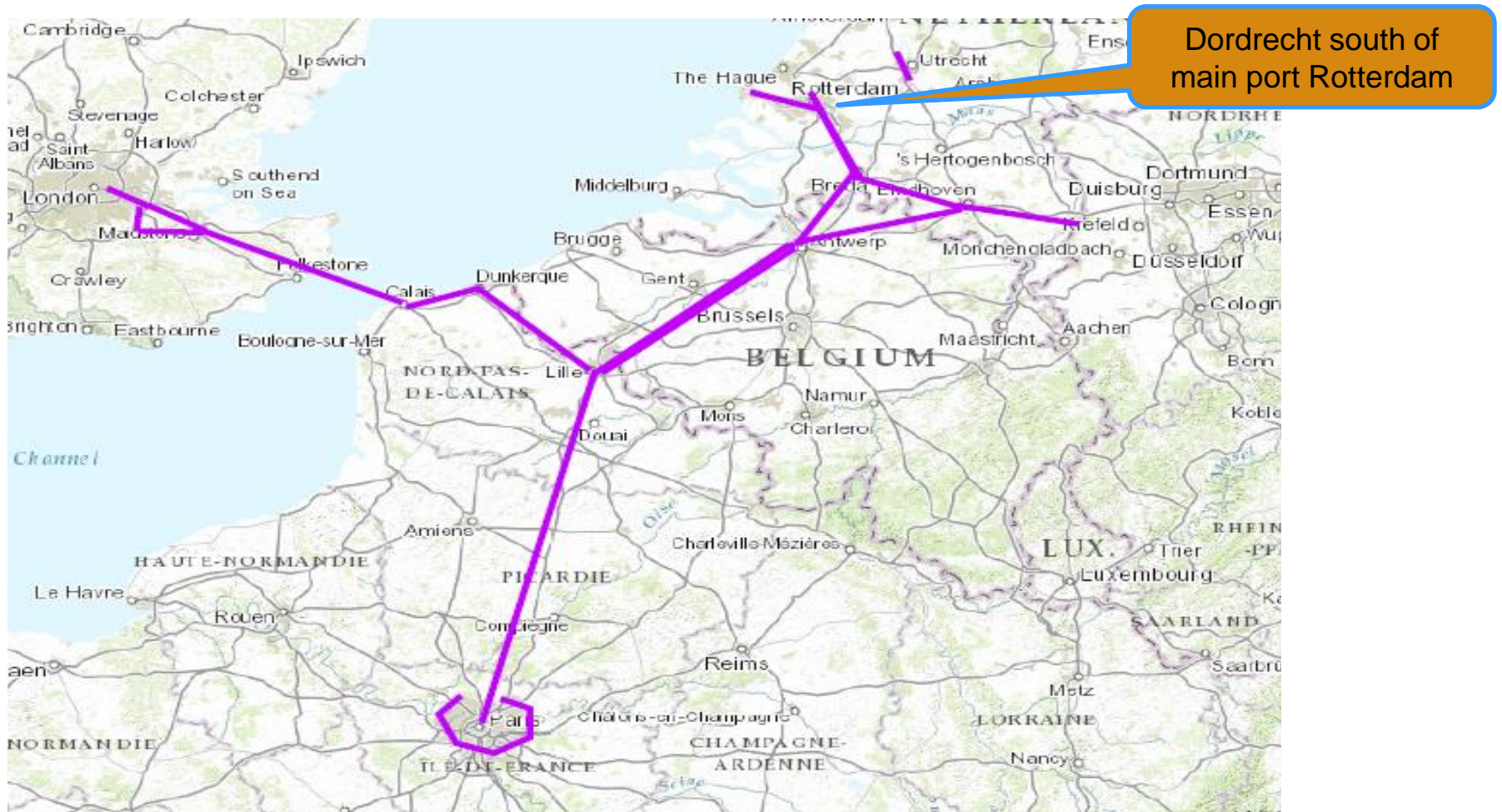
InterCor (3) Specification Baseline (ii)

Dutch C-ITS Corridor Profile 3.0

- Basis for future InterCor specifications
- Based on C-ITS Corridor AT-DE-NL Profile
- Highlights:
 - profiled: used / not used
 - event position, reference position
 - traces, zones



InferCor (4) Field Test and Test Track (i)



Co-financed by the European Union
Connecting Europe Facility

InferCor (4) Field Test and Test Track (ii)



InferCor (4) Field Test and Test Track (iii)

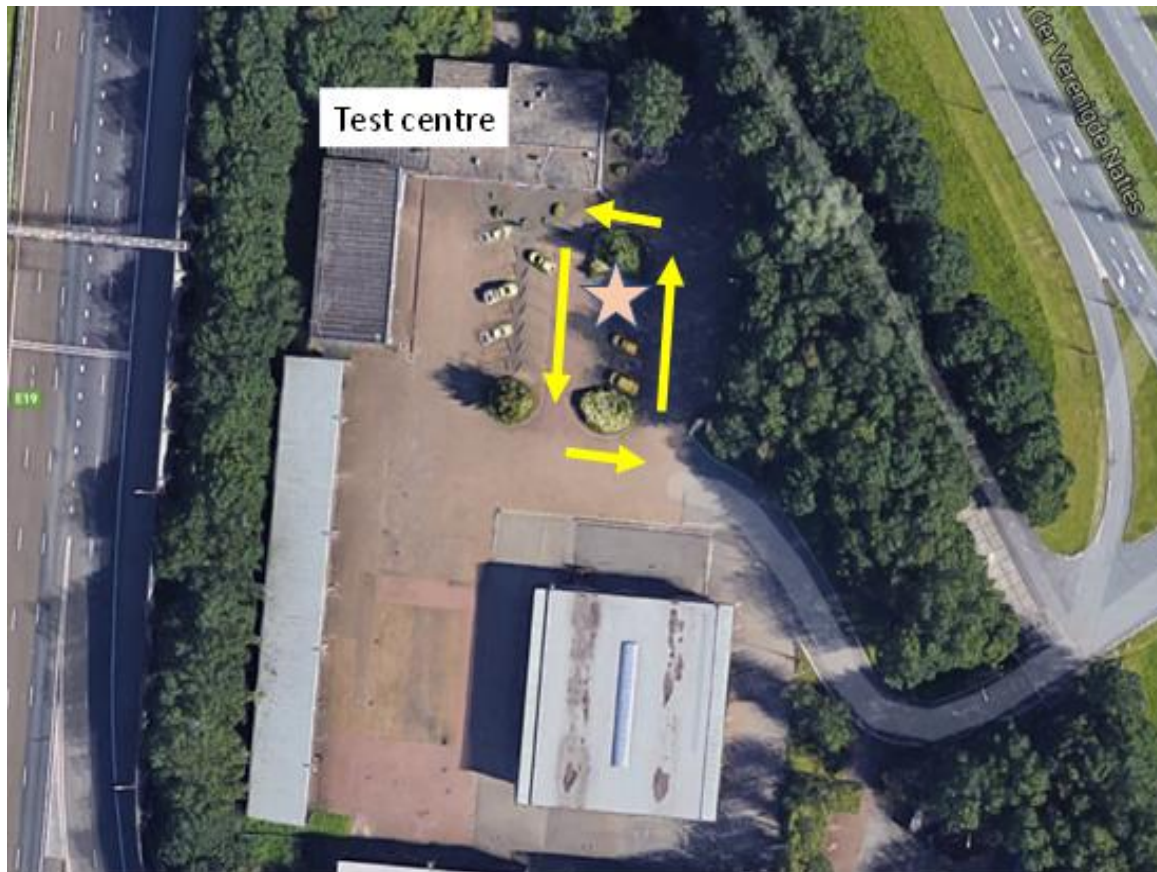
Three levels of tests

- **Desk tests:** These tests can be performed inside the offices of the Test centre
- **Lab tests:** These tests can be performed on the premises the Test centre
- **Open Road tests:** These tests can be performed on an actual motorway, the A16 from Rotterdam to Dordrecht and visa versa.



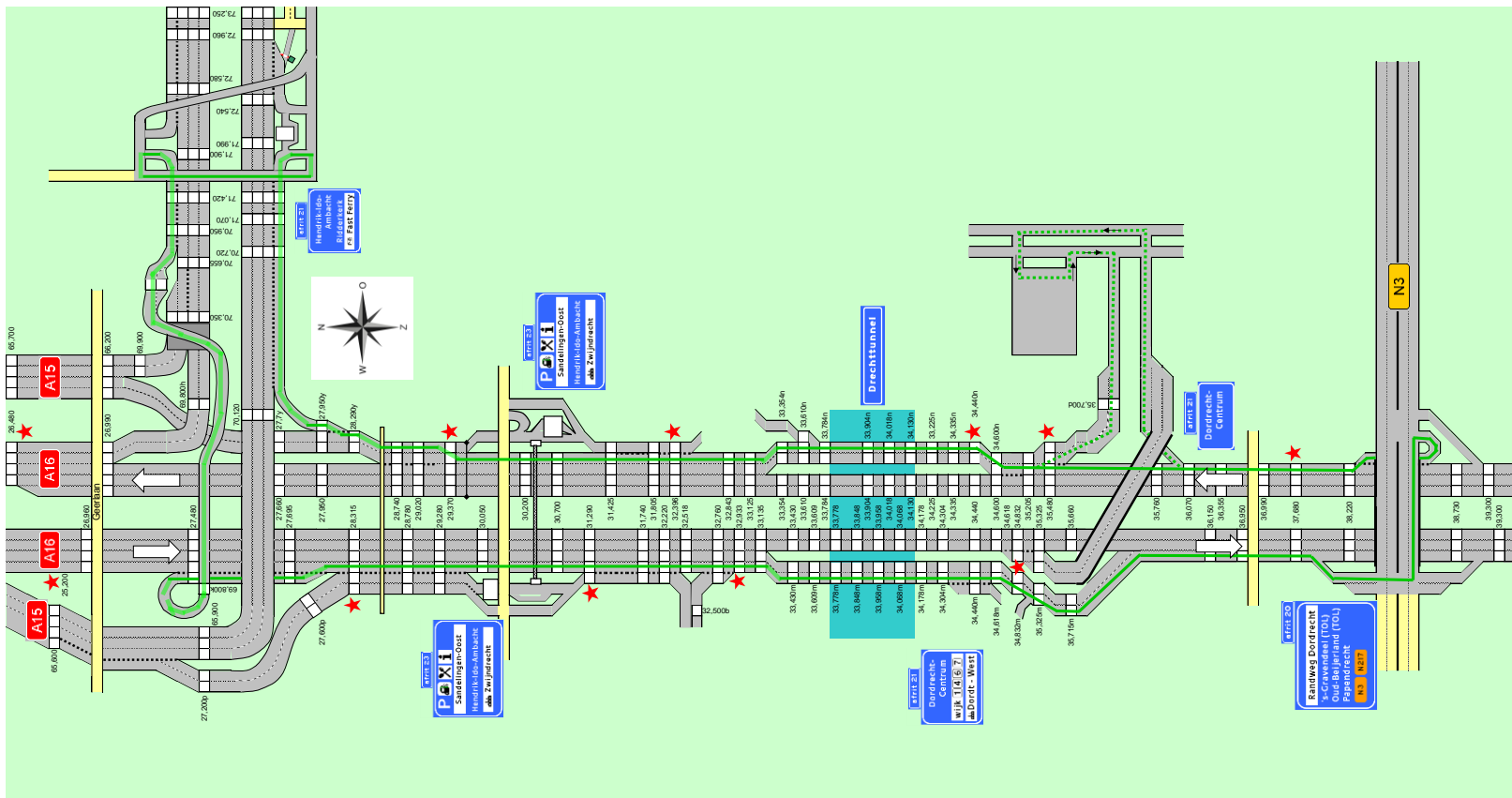
InerCor (4) Field Test and Test Track (iv)

Desk tests and Lab tests on location of the Test centre



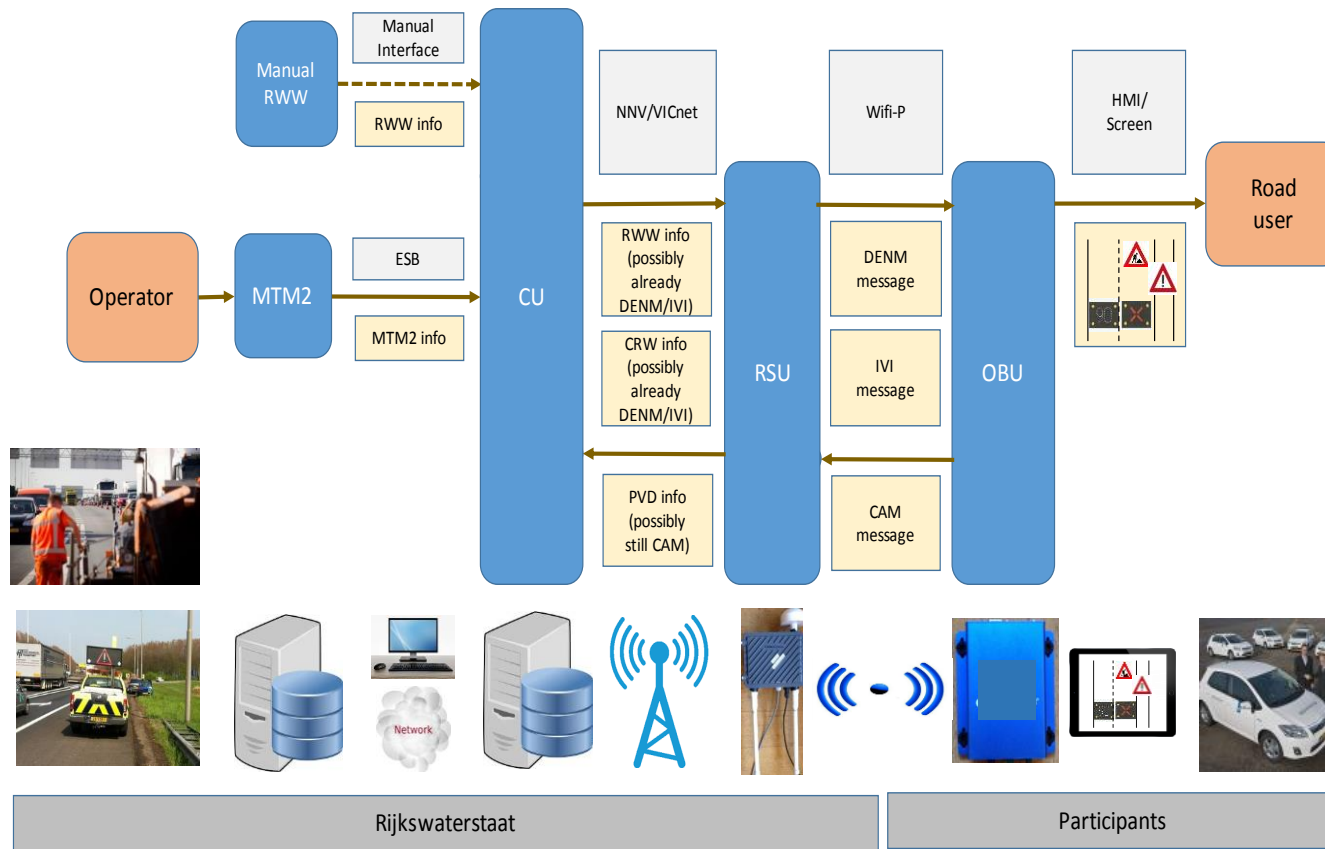
InerCor (4) Field Test and Test Track (v)

Open road tests: Test area and recommended route



InferCor (4) Field Test and Test Track (vi)

System overview



InferCor (5) Test scenarios (i)

Seven types of scenarios

Known-Real-RWW. There will be one predefined actual real-life road works. This will be a situation where the right lane is blocked.

Known-Real-IVS. Accompanying these real-life road works there will be road signs on overhead variable message signs on gantries. These signs will depict red crosses, arrows pointing left or right, speed limits (90, 70, 50) or end-of-restrictions.



InferCor (5) Test scenarios (ii)

Known-Virtual-RWW. Additionally there will be several predefined but virtual road works. These scenarios will be supported by a photo-script depicting imaginary trailers on the road.

Known-Virtual-IVS. Comparable to Known-Virtual-RWW there will also be Known-Virtual-IVS with (imaginary) road signs on overhead variable message signs on gantries.

Known-Virtual-CRW. Comparable to the above there will also be a limited set of virtual events denoting a traffic inspectors vehicle standing still on the motorway.



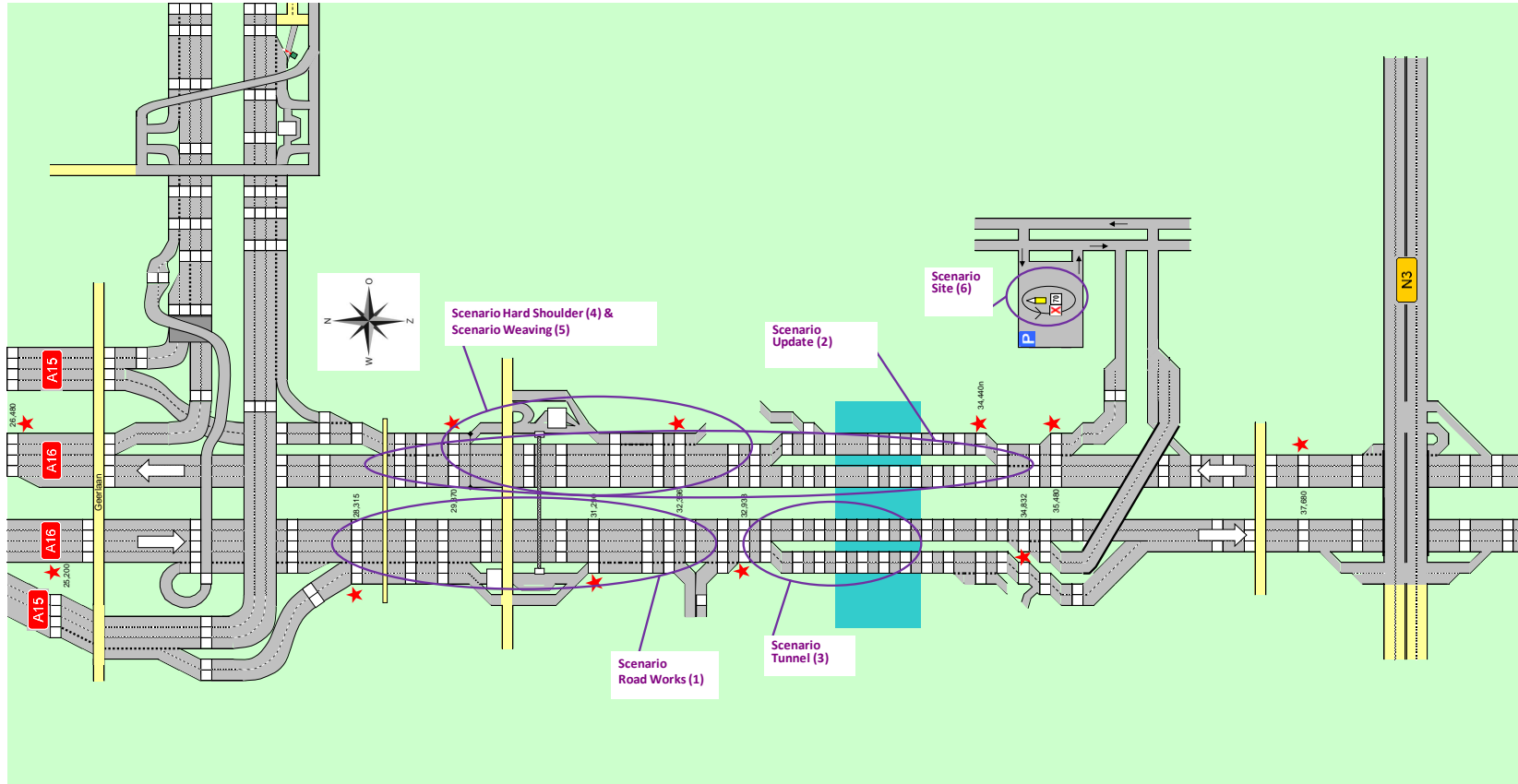
InferCor (5) Test scenarios (iii)

Unknown-Real-RWW: Apart from the known scenarios, there may - since we are operating in a live environment - also be unknown road works. It is quite possible that maintenance work performed by others takes place during the test days. In case such events happen on a stretch which also holds a virtual scenario, the virtual scenario will prevail.

Unknown-Real-IVS. As for the unknown-real-RWW there may also be unknown-real-IVS. The signalling system may, for instance due to congestion, automatically generates warnings on overhead variable message signs. The relevant IVI messages will be generated automatically. Here also, in case of a conflict, the virtual scenario prevails.



Scenario overview (1)



InferCor (5) Test scenarios (v)

Scenario overview (2)

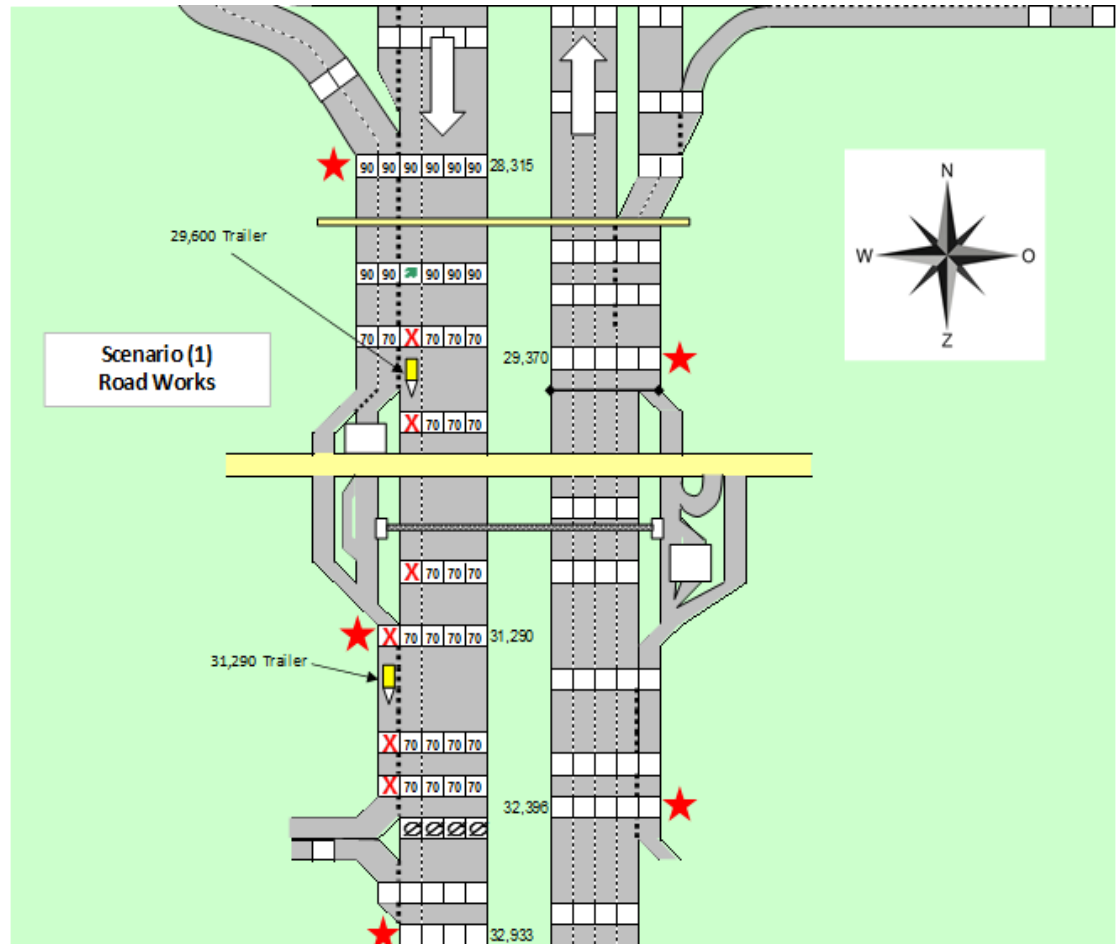
Preliminary Scenario Overview								
Types of scenarios		Known					Unknown	
		Real		Virtual			Real	
Scenarios		RWW	IVS	RWW	IVS	CRW	RWW	IVS
1	Road Works							
2	Update							
3	Tunnel							
4	Hard Shoulder							
5	Weaving							
6	Site							
7	RWW							
8	IVS							



InferCor (5) Test scenarios (vi)

Known-
Real-
RWW&IVS:

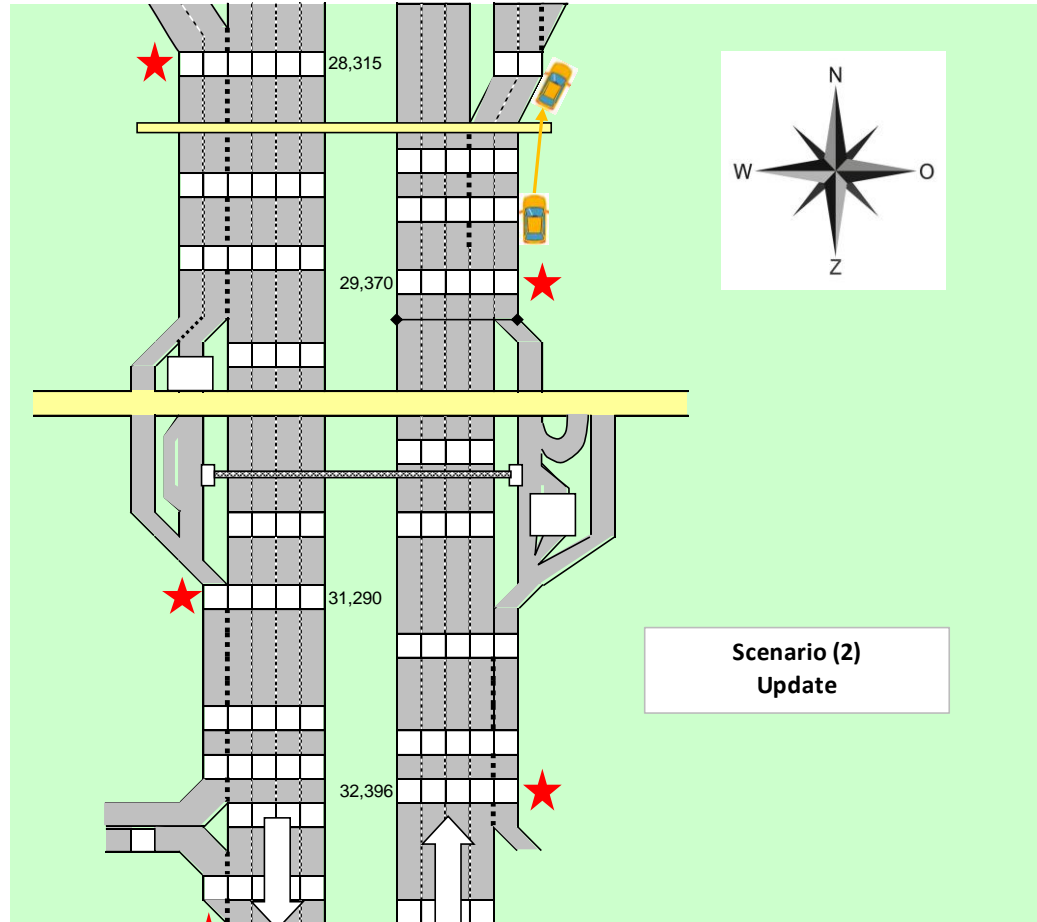
Road Works (1)



InferCor (5) Test scenarios (vii)

Known-
Virtual-
CRW:

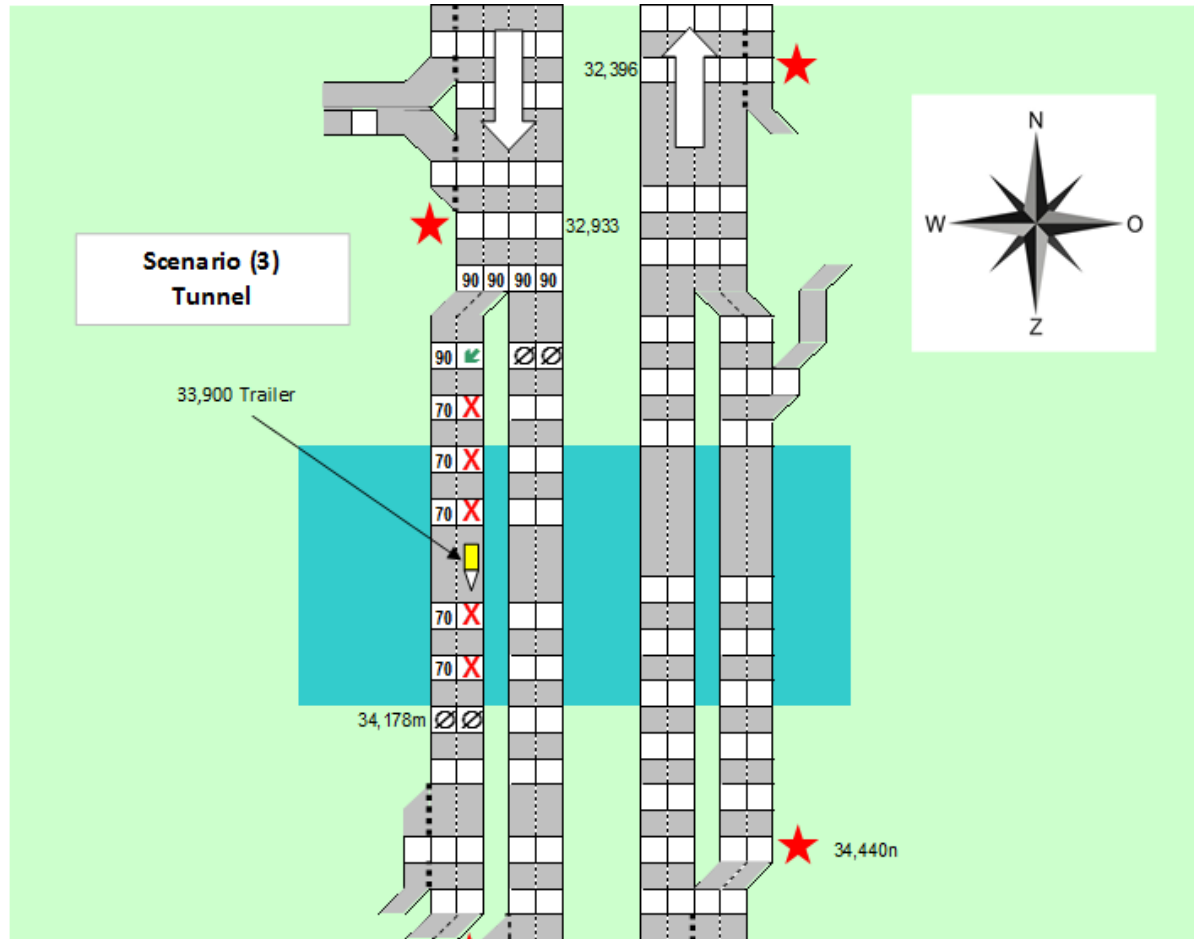
Update (2)



InferCor (5) Test scenarios (viii)

Known-
Virtual-
RWW&IVS:

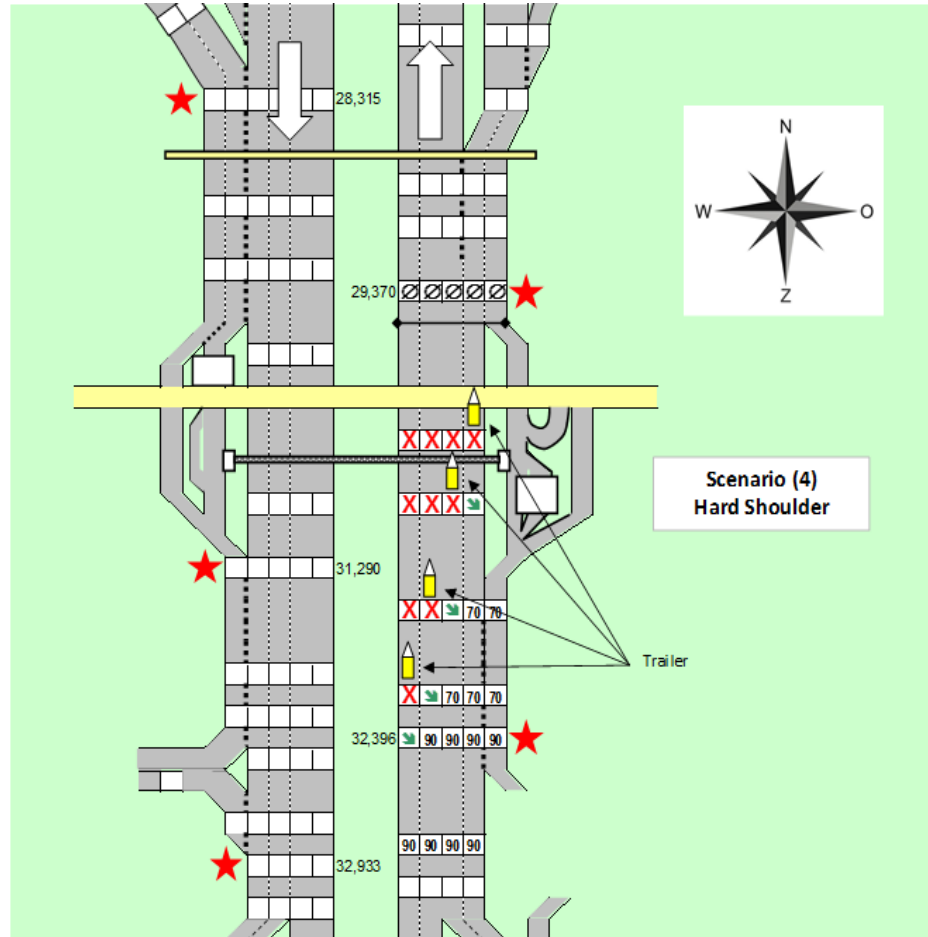
Tunnel (3)



InferCor (5) Test scenarios (ix)

Known-
Virtual-
RWW&IVS:

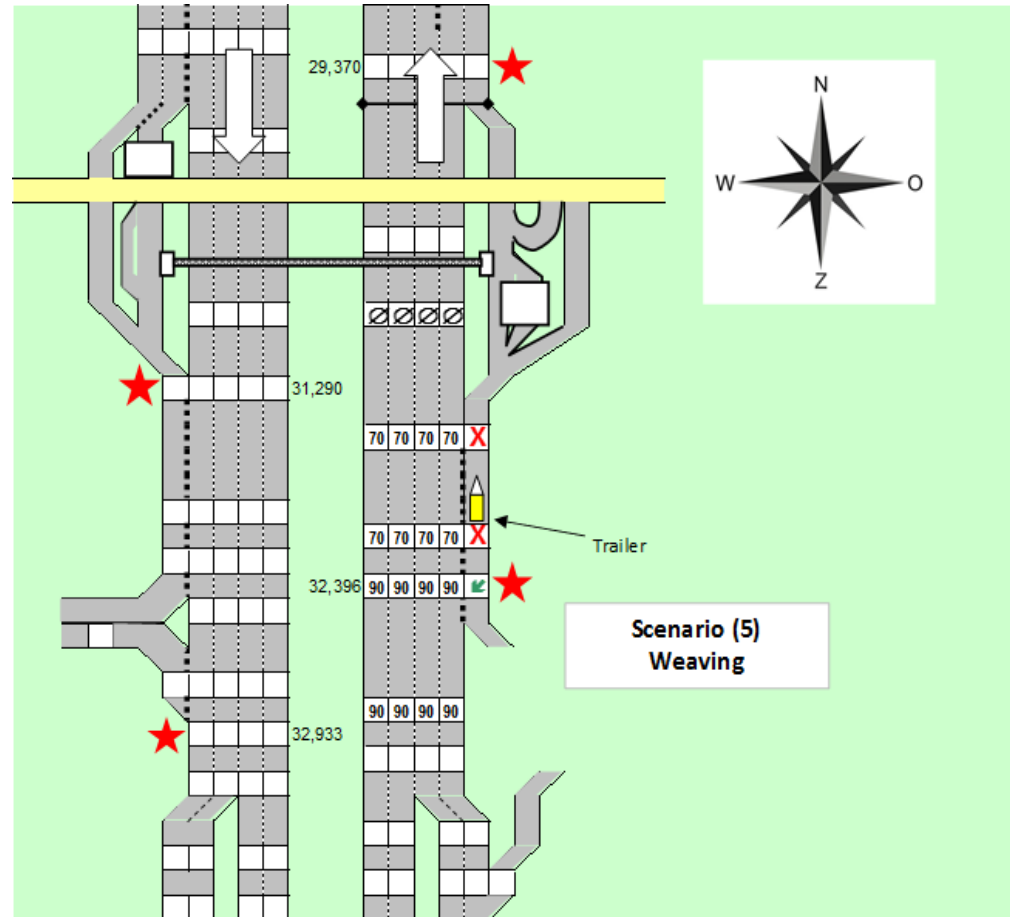
Hard Shoulder (4)



InferCor (5) Test scenarios (x)

Known-
Virtual-
RWW&IVS:

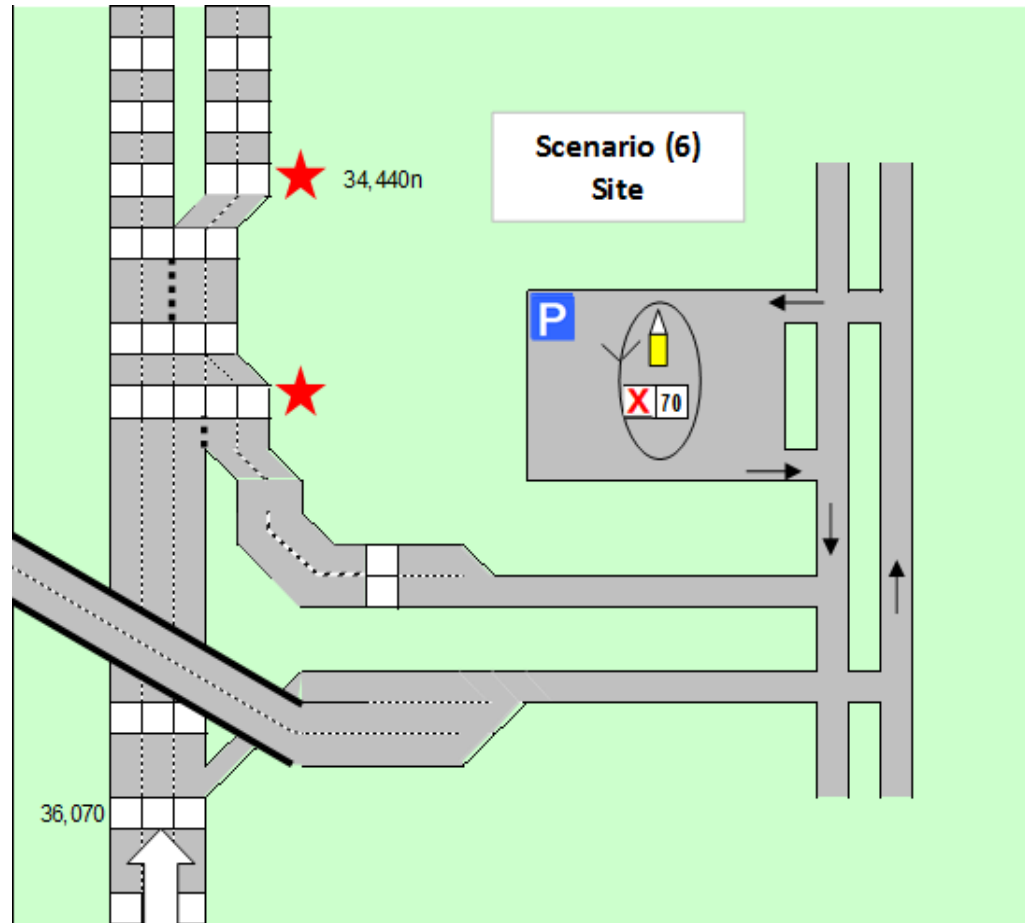
Weaving (5)



InferCor (5) Test scenarios (xi)

Known-
Virtual-
RWW&IVS:

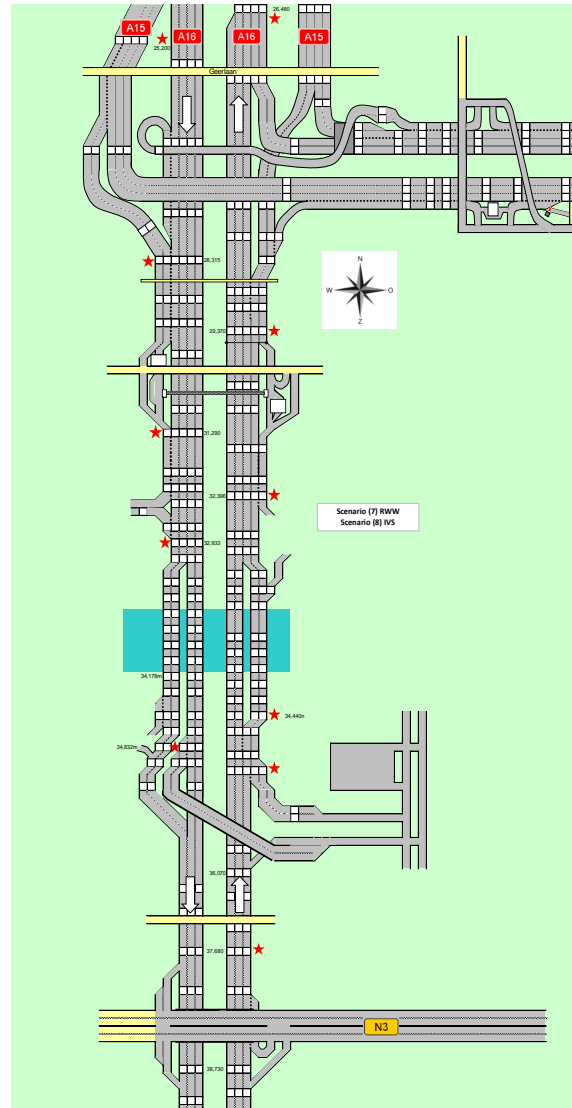
Site (6)



InferCor (5) Test scenarios (xii)

Unknown-
Real-
RWW&IVS:

RWW (7) and IVS (8)



An InterCor test protocol, suggesting different test cases for the 4 test days, will be made available to the participants.

This test protocol is made using the following input:

1. Test requirements from InterCor
2. Possibilities from test site (C-ITS Corridor)
3. (test) equipment



For RWW, IVS and PVD a set of common ITS-G5 specifications is being drafted in InterCor

- Based on input from the Netherlands (Dutch C-ITS corridor 3.0) and France profiles (Scoop vs2)
- The C-ITS corridor test site has implemented the latest version of the InterCor profile. This testfest (among others) will provide input to finalize the InterCor specifications

Every vehicle / OBU implementation will nevertheless have it's own interpretation and implementation of these services. Profiles leave room for interpretation, goal of services will be different

- Gap analyses on paper between FR and NL have been performed on current profiles, revealing already a couple of points of attention

Only actual field tests can really show the level of service interoperability

This InterCor test fest is an unique opportunity to do so, as many implementations from different countries will be available



The test cases should cover as much aspects as possible regarding the usage of the profiles. Among others InterCor would like to analyze:

- Correct interpretation of the messages
 - Regarding timing aspects
 - Regarding the relevance of the message
 - New messages, updated messages
 - Loss of GPS
- Influence of road topology (2,3,4 lanes, merging lanes, hard shoulder)
- Expected input from mandatory fields and optional fields
- Identified gap analyses aspects (event history, event location, usage of traces, ..)
- ...



InterCor(6) Test protocols (iv)

Possibilities from test site

- Desk tests, Lab tests and Open Road tests
 - This enables InterCor to have both controlled testing and testing on the real road, with even a real Roadworks
- 6 test scenarios (besides the 2 unknown test scenarios) are available
 - The available scenarios offer a variety of possibilities, making it possible to cover the test requirements from InterCor
 - Roadworks on different road topologies, parallel road, merging lanes, tunnel (loss of GPS), the update and cancelation messages
- Many of the test requirements of InterCor can be fulfilled using the test scenarios made available



Test equipment

- OBUs from the participants
 - Containing RWW and/or IVS implementations, providing input for PVD
 - Providing logging information, making it possible to do the evaluation
- RSU's with the Dutch implementation of the InterCor profile
- Log data analysis tools
- Paper (to write down the observations while testing)



For Monday controlled tests on the site (parking lot) are suggested, to let everyone prepare for the three test days to follow

- The test cases on the site will be basic, allowing participants to get familiar with the RWW and IVS messages
- More complex test cases will be available on the test track, using one or two of the virtual scenarios

For Tuesday till Thursday the test protocol will suggest a couple of routes on the test track, using the available real and virtual scenarios

- These tests will range from basic to complex
- On the site the basic test cases will still be available

Individual testing is of course also possible and allowed



(6) Test protocols (vii)

At the end of every test day (~14:00) log data will be collected (USB or upload to central location), this data will be analyzed

In the De-briefing we will together discuss the results. Both results from log-data as observation from the vehicles will be input for these sessions





InferCor (7) Logging & verification (i)

Objectives for verification of service interoperability

- Assumptions
- Verification objectives
- De-Briefings

Logging

- Data needed for verification
- Formats

Assumptions

1. OBUs are compliant with ITS-G5 standards
 - CAM, DENM, IVI, ..., GN, ...
 - passed ETSI PlugTests, Eco-AT, SCOOP@F, ...

2. Differences in profiles
 - Road Operator specific applications and regulations
 - C-ITS Corridor road side infrastructure and profile

3. OBUs can provide logging
 - Relevant decisions made by the application in the reception, processing and presentation of DENM and/or IVI events is logged
 - What logging formats are used?

Verification objectives of interoperability of services:

Focus on potential differences

- Interpretation of data elements, especially the optional elements
 - Traces, relevance and detection zones
 - Driving direction, parallel roads, on and off ramps
 - Applicable lanes, lane closures, road signs
 - Concurrent events
- Application logic to inform / warn drivers
 - Timing and location of presentation and revocation

Note: HMI design and user interaction is not subject of TESTFEST

Communication performance & RSU deployment



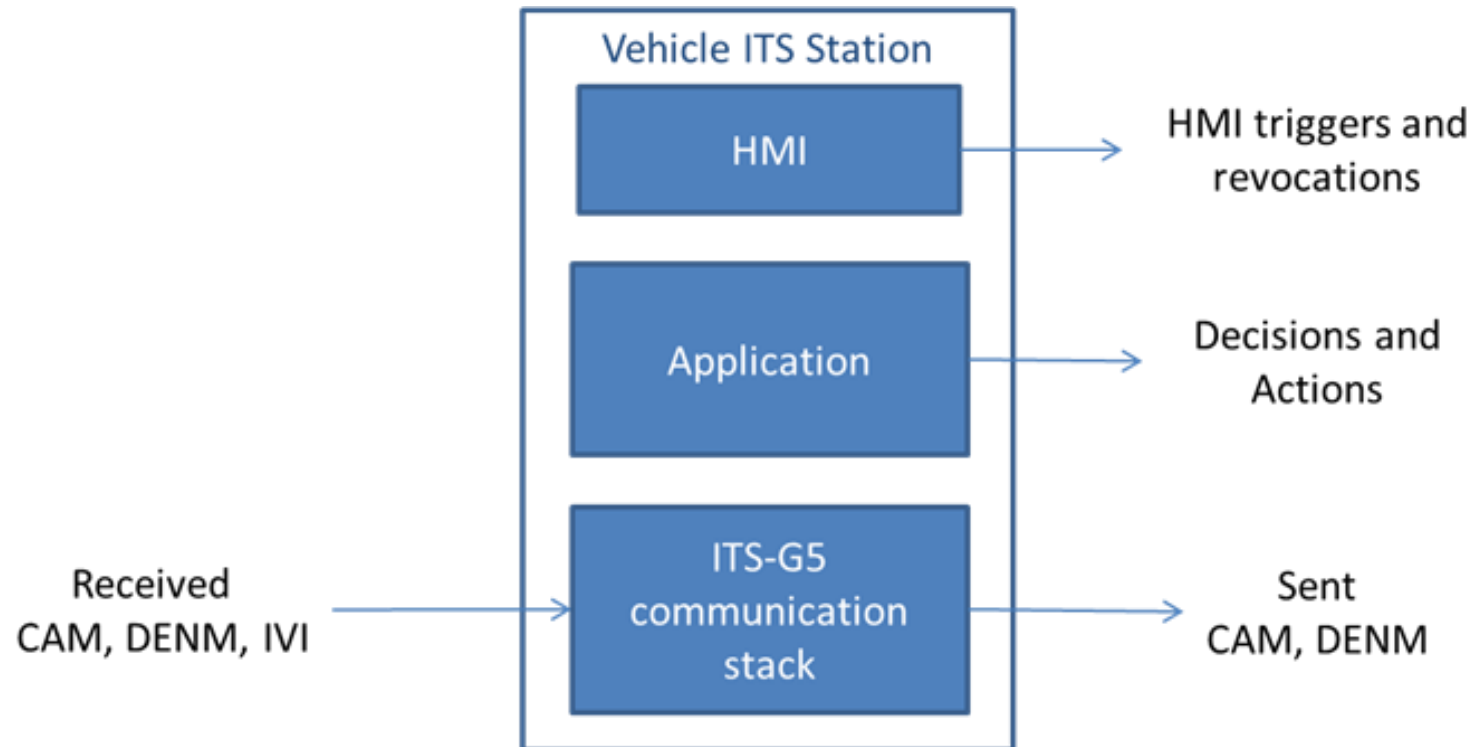
Delay de-briefings

Objective is to harmonize cross-border interoperability, in particular standards & profiles

- Share and compare observations, and views shortly after each test session/day
- Participants are requested to share data
 - Participants collect notes, logging, dash cams footage, ..?
- InterCor provides analysis reports on predefined/potential issues
 - For on-site data analysis as input to debriefings, InterCor needs log data in predefined format



Logging requested at three levels



InterCor (7) Logging CAM, DENM, IVI (vi)

- Sender logs complete ASN.1 message
- Receiver logs at least message id information
 - for example for DENM:
 - Action = {"SENT", "RECEIVED"}
 - DENM.originatingstationid
 - DENM.sequencenumber
 - DENM.referencetime in TAI.
- Logging in text (CSV or SQL)
 - Mandatory data to distinguish stations and applications within stations
 - log-timestamp
 - log-stationid
 - log-applicationid
 - Message contents
 - Encoded in UPER or XER and added to csv
 - Interpreted (incl scaling, enums, ..) in CSV or SQL
- See ["InterCor_CommonCommunicationLogFormat.xlsx"](#) and example files



(7) Logging Applications & HMI

(vii)

- Log actions for predefined DENM/IVI event models, e.g.

id	DENM Event Model
1	Generate message
2	Receive message
3	Relevance detected
4	Location matching on trace
5	Trigger driver awareness
6	Hmi presentation

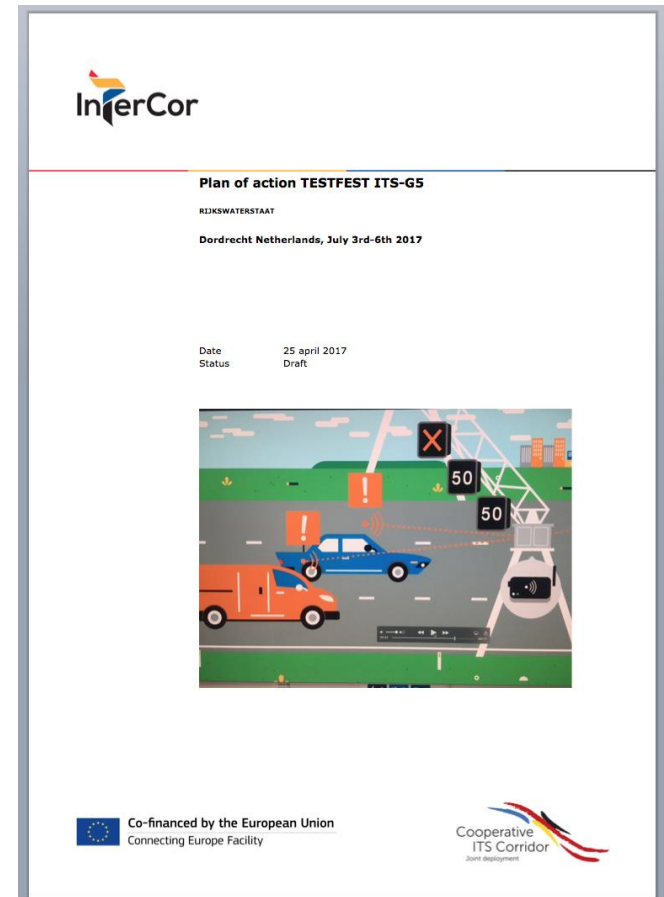


id	DENM ActionModel
1	In time validity duration
2	Time invalid
3	In relevance distance
4	Not in relevance distance
..	Relevant cause code
...	Cause code not processed/implemented

- See [“InterCorCommonApplicationLogFormat.xlsx”](#) for event and action models
- Assumption: OBU logic and logging can be mapped to subset of events and actions

InterCor (8) Follow up (i)

- Information set will be available for confirmed registered participants
- PCAP files will be sent before June 15th
- Weekly TESTFEST Question Time, every Thursday 13:00 CET, starting for confirmed registered participant
- Both webinars are recorded and downloadable from the InterCor website





For contact

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Further information

Hosting project C-ITS Corridor:

www.its-corridor.nl

InterCor:

www.intercor-project.eu



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