



C-ROADS WG3 EVALUATION AND ASSESSMENT INTRODUCTION TO THE C-ROADS EVALUATION APPROACH

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C-ITS deployment and evaluation workshop

European ITS Platform and C-Roads Platform

Programme: Day 2 – 6 November 2019 – C-ITS Evaluation
Location: ENGIE Tower Brussels, Avenue Simon Bolivar 34, Brussels

Time	Topic
9:00 – 9.15	WELCOME C-Roads Secretariat - M. Böhm
9:15 – 9.30	Introduction to the C-Roads Evaluation approach - L. Studer
9:30 – 11.15	Experiences and preliminary results from C-Roads pilots Presentations: IRELAND, CZECH REPUBLIC, SPAIN, ITALY, FRANCE, AUSTRIA
11:15 – 11.30	COFFEE BREAK
11:30 – 13.00	Experiences and preliminary results from C-Roads pilots Presentations: GERMANY, BELGIUM, SLOVENIA, UNITED KINGDOM, THE NETHERLANDS, NORDICWAY
13:00 – 14.00	LUNCH
14:00 – 14.15	Evaluation of User Acceptance in C-Roads
14:15 – 15.30	Presentations of invited Speakers and C-ITS projects to discuss about evaluation approaches and implementations results. Presentations: C-MOBILE, AUTO C-ITS, CONCORDA, EU-EIP, C-ITS-CORRIDOR, SOCRATES ^{2.0} , CITRUS
15:30 - 16.00	Roundtable and open discussion
16:00	END OF THE WORKSHOP

Objective of the Workshop – Day 2

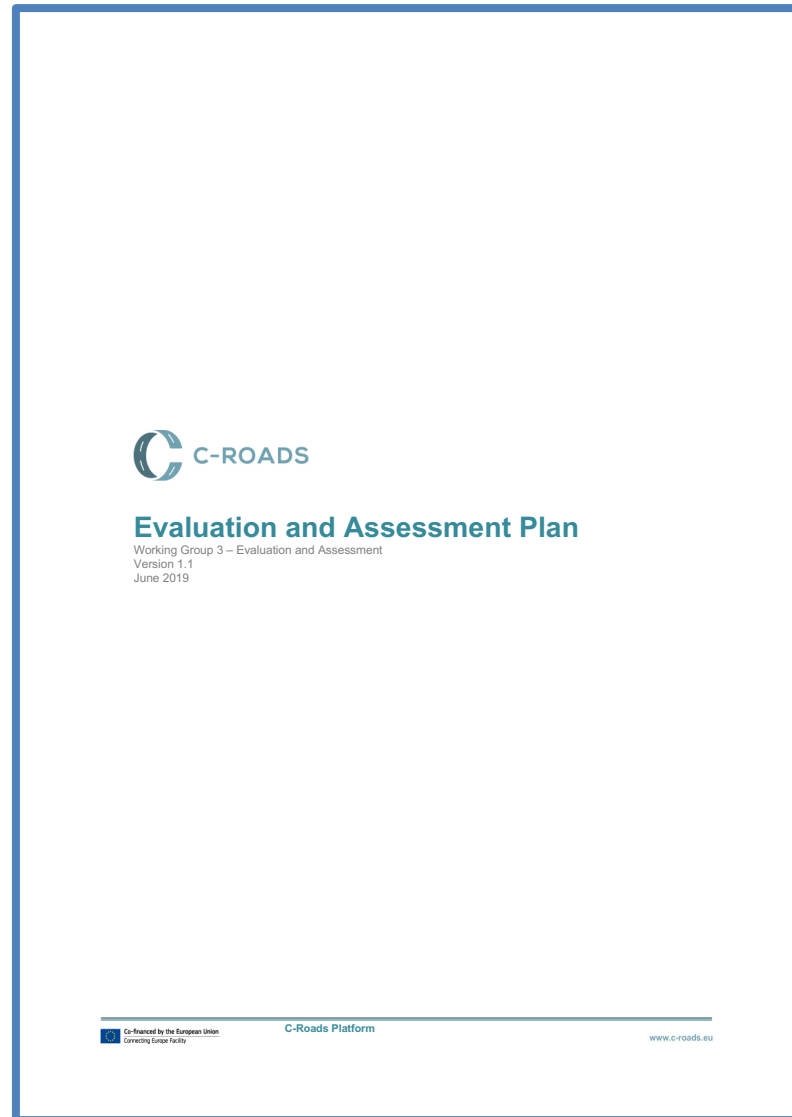
- ③ Share WG3 approach for C-ITS impacts assessment
- ③ Share first preliminary results from C-Roads Pilots
- ③ Learn and share knowledge with other Projects on this topic
- ③ Understand what has been done, share it with the Evaluation Community and fine tune the next activities

C-Roads WG3 “Evaluation and Assessment” approach to impacts evaluation

Objective:

- Ⓒ to create the **common approach** for evaluating and assessing the C-ITS impacts within C-Roads Pilots and Field Tests
- Ⓒ to **coordinate** C-Roads Pilots and **share experiences**
- Ⓒ to **assess the impacts** of C-ITS introduction on European roads.

Evaluation and Assessment Plan v. 1.1, C-ROADS July 2019 available at www.c-roads.eu



C Evaluation approach defined for all Day 1 and 1.5 **Use Cases** defined by C-Roads

IVS	HLN	RWW	Signalized intersection
Dynamic Speed Limit Information	Accident Zone	Lane closure	GLOSA
Embedded VMS "Free Text"	Traffic Jam Ahead	Road closure	Public Transport Prioritization
Other Signage Information	Stationary Vehicle	Roadworks mobile	Signal Phase and Timing Information
Dynamic Lane Management	Weather Condition Warning		Imminent Signal Violation Warning
	Temporary slippery road		Emergency Vehicle Priority
	Animal or person on the road		
	Obstacle on the road		

- C In-Vehicle Signage (IVS)
- C Hazardous Location Notification (HLN)
- C Road Works Warning (RWW)
- C Signalized Intersection

Evaluation and Assessment Approach

Pilots will evaluate the impacts of Day 1 and 1.5 C-ITS Services and Use Cases implemented during the different Pilot Tests with respect of the following impact areas:

- Ⓒ User Acceptance
- Ⓒ Safety
- Ⓒ Traffic efficiency
- Ⓒ Environment
- Ⓒ Socio-economic

Evaluation and Assessment Approach

- © A core objective of Pilots is to better understand the effects of providing C-ITS services to the Users.
- © **Users' Behavior changes** of driver/vehicle will be measured. During the field tests it will be possible to measure or calculate different parameters that can reveal a different behavior of the driver because of the receipt of information via C-ITS.
- © The measurement of changes in User Behavior provides a first indication of the **impacts, at a field test level**, of C-Roads implementations.

C The Plan **suggests** the data to be collected during the pilot phase for service evaluation and formulates links between these data and research questions. The Pilots get a guideline to assess and evaluate the main impacts of C-ITS service introduction.

Table 41 - HLN - Relation between Sub Research Question for Safety and collected Data

Sub Research Question	Speed	Acceleration Deceleration	Time	Position	Steering angle	Message data log
How do the instant speed fluctuations change?	X	X	X	X		X
Is driver's speed more compliant with speed limit (if suggested)?	X		X	X		X
How does the lane change point vary (if the lane of the event is specified)?			X	X	X	X
Is the lane change manoeuvre smoother (if the lane of the event is specified)?		X	X	X	X	X
Does the average speed decrease?	X		X	X		X

Definition of Field Test Indicators / KPI

Table 42 - HLN - Relation between Field test indicator KPI for Safety and collected Data

Field test indicator KPI	Speed	Acceleration Deceleration	Time	Position	Steering angle	Message data log
Speed adaptation	X		X	X		X
Average Speed	X		X	X		X
Maximum Speed	X		X	X		X
Speed standard deviation	X		X	X		X
Instantaneous acceleration		X	X	X		X
Lane change point			X	X	X	X
Maximum steering angle			X	X	X	X

- Definition of a **shared approach for the calculation of KPIs on mobility** when C-ITS will be more widely diffused, starting from the data measured or calculated during the field test. This estimation will be based on algorithms, traffic modeling but even through qualitative estimation.
 - Example Safety KPI: Change in road accident resulting in death or injuries numbers
 - Example Traffic Efficiency KPI: Change in Bottleneck Congestion, Change in travel time, Change in Total time spent by all vehicles in queue
 - Etc.
- Definition of a shared approach for the **assessment of the (economic) benefits** of the C-ITS services generated by the KPIs.

From Field Tests to the assessment of C-ITS impacts on mobility

Final step is the definition of a common and shared approach to ASSESS the impacts of C-ITS on mobility starting from MEASURES collected during field tests.

KPI = EFFECTIVENESS x TARGET = POTENTIAL IMPACT

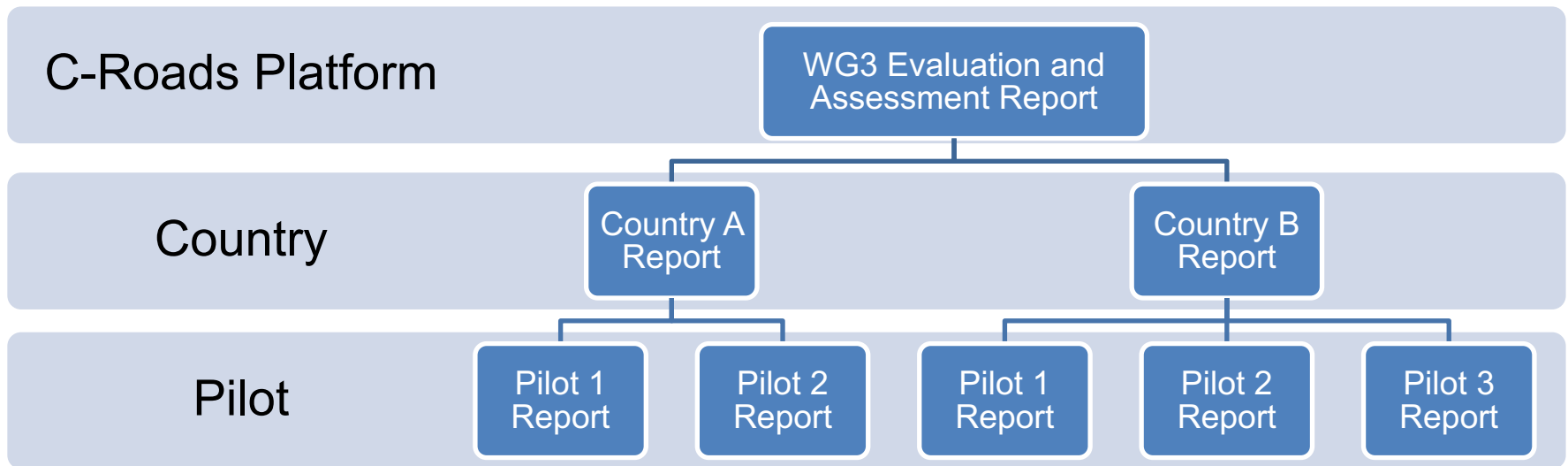
Example: Safety

Estimated effect on Accident reduction of modified drivers' behaviors (based on C-Roads field test and Experts judgement) x number of potential affected accidents = total estimated number of incidents reduction.

Applied to SAFETY, TRAFFIC EFFICIENCY AND ENVIRONMENT

WG3 reporting

- Definition of the Final WG3 Report – from Pilots' reports to National Reports to the overall C-Roads WG3 Report





THANK YOU!

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