

I. IDENTIFICATION DATA

Thesis title:	Design of system solution for realization of evaluation of the C-ROADS CZ
Author's name:	Bc. Michal Mlada
Type of thesis :	master
Faculty/Institute:	Faculty of Transportation Sciences (FTS)
Department:	K 614 – Department of Applied Informatics in Transportation
Thesis reviewer:	Ing. Martin Volný
Reviewer's department:	INTENS Corporation s.r.o.

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
Please insert your comments here.	
<p>The project assignment focused on innovative technological systems called cooperative ITS systems (C-ITS), which are being widely deployed withing the EU countries under umbrella of C-ROADS initiative. Due to the fact, that C-ITS systems are standardized a harmonized in their deployment / operations common evaluation framework is still being developed. The evaluation process could be very complex due to focus on various aspects of the system starting with technical aspects inc. system performance, reliability etc. going through evaluation of user acceptance and impact assessments of displayed warning messages to the drivers. There are no existing complex methods for evaluation available in the Czech Republic focusing on C-ITS systems and therefore this master thesis could set an elementary base stone for future use.</p>	

Fulfilment of assignment	fulfilled
<i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	
Please insert your comments here.	
<p>The master thesis had defined five goals, which needed to be explored and described within this work. The author has followed the predefined areas and clearly investigate, analyze and describe them in individual chapters which makes the thesis compact and clear for orientation. To my opinion, all the primary goals have been achieved and author has delivered even more work than expected by developing relevant SW tool, which help him process collected data and set base for further evaluation. Author has attended as well real time testing in defined Use cases in order to collect data for further evaluation and actively supported his colleagues from the university during these tests.</p>	

Methodology	correct
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
Please insert your comments here.	
<p>The methodology proposed and used within this thesis is based on analytical outcomes from various projects / initiatives focused on C-ITS deployment / testing and generally accepted Field Operation Tests (FOT) described in FESTA handbook. The methodology</p> <p>Within the theses two Use Cases have been selected out of overall 14 Use cases defined within C-ROADS CZ Use case catalogue and deployed within the C-ROADS CZ deployment areas. Selected Use cases were Intersection signal violation (ISV) and Railway crossing (RLX), which are the most difficult use cases for repetitive and extensive testing under real condition operation. Those Use cases has been selected by the author during the master thesis development and they represent the most safety oriented (warning messages provided) use cases within the C-ROADS CZ project. On the other hand it is believed, that the real execution of these Use cases could create "risk" environment in meaning focusing on the Use case and its scenarios execution in real environment. Shame is, that the author could not have the option to perform</p>	

more test rides for each of the tested Use case scenario and the conclusions are based on low number of repeatable results. On the other hand, I do appreciate the complexity of the test performed in real life environment including large number of people needed for successful runs of the Use cases. Therefore, the conclusion conducted could not be hundred percent adopted and will need further work to be done to prove that the use case safety benefits are clearly highlighted.

Technical level

A - excellent.

Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?

Please insert your comments here.

The author has shown high level of technical knowledge of C-ITS systems and other technological equipment needed for the real live test execution. C-ITS technology is new and not fully discovered area, where need to be more technical evaluation performed over long period of time, but the author has used the test tools (OBU) and other SW components and performed successful testing, data logging and extraction. The author has clearly described what each objective were and has fulfill the thesis objectives.

Formal and language level, scope of thesis

A - excellent.

Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?

Please insert your comments here.

This master thesis are very well prepared following defined objectives with logical structure of the document starting from analytical part, going through design and develop phase to execution and evaluation part. The scope of the thesis is sufficiently extensive supported by annexes describing detail technical information / examples of questionnaires etc. Author's knowledge of English is more than satisfactory, the text is clear to understand. Author used correctly technical phrases and explanatory words to help reader better understand the point he made.

Selection of sources, citation correctness

A - excellent.

Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?

Please insert your comments here.

Author has used correctly the sources and citation in the master thesis, following the investigation and analytical work he has performed. Based on the fact, that the topic of this theses is focusing on innovative areas of Intelligent transport systems (ITS) – the Cooperative ITS (C-ITS) and the evaluation during real operation of these systems are still in progress on EU level. Therefore, some of the scientific papers may not be easily available for students. Despite of this the author has correctly used most available information sources and recommendations for evaluation in similar projects.

Additional commentary and evaluation (optional)

Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.

Please insert your comments here.

The evaluation of impact of new C-ITS systems will need longer time operation and more data collected in order to make conclusions, which will be supported by measurements. At the moment, for the purpose of this thesis the performed test needs to be sufficient as the author does not have any power / capability to run more real time test as all the test have been depended on other people (e.g. police of the Czech republic, partners of the C-ROADS CZ projects etc.). The results of the evaluation have shown some potential of C-ITS systems to increase safety in critical Use cases. Proposed methodology within this thesis need to be further explored and, in more detail, tested, but it has a potential to be used as template for further testing of different Use cases.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

In conclusion the master thesis has been developed in clear structure, easy to read and understand for reviewer. Its content combines both theoretical and practical parts nicely presented in the document and its appendixes. The author has shown good knowledge of the innovative field of C-ITS and his presentation skills (in written form) are very good for graduated student. Additionally, he was able to participate on setup and performance of C-ROADS CZ pilot testing for selected Use cases and actively support the successful delivery of these tests.

The grade that I award for the thesis is **A - excellent**.

Date: **4.9.2020**

Signature:

