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Work-Package 4: “Verification and Validation”

Preliminary safety Evaluation Criteria

Latex Document Draft

Jan Welte

May 2013
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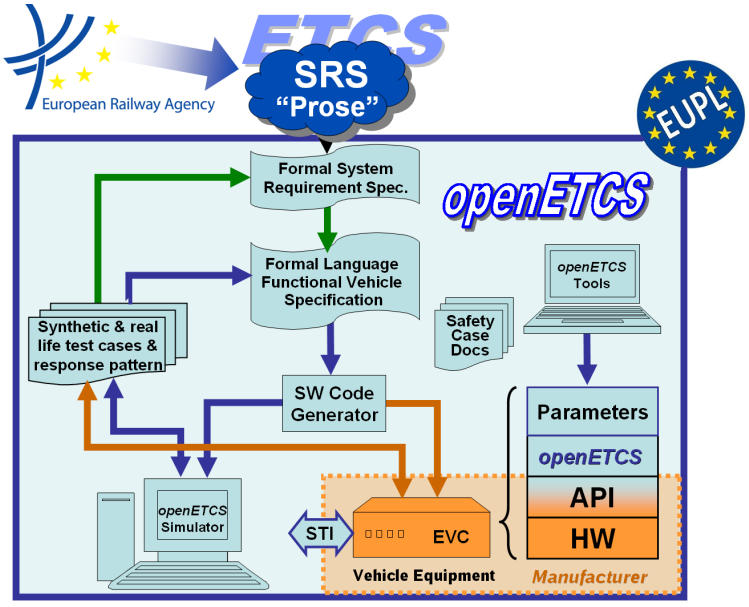

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Output for secoundary tool evaluation

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Abstract: This document presents an overview of the safety related evaluation criteria used within the openETCS document structure and based on this derives evaluation criteria for the choice of suitable tools and methods for all safety activities which have to be performed during the openETCS development process. These criteria are based on the safety activities required in D2.6 and the general concept for an openETCS safety process.

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1.1 Safety artifacts

Abbreviation Verification Categorization Degree of Formalisation C Code: used for the executable model Strictly-Formal CSB Code Safety Backlog: list of requirements/ properties to be implemented inside the dM derived from the HL (and the dMSB) Semi-Formal/ Strictly-Formal dM Detailed Model: model used for code generation Semi-Formal/ Strictly-Formal dMSB Detailed Model Safety Backlog: list of requirements/ properties to be implemented inside the dM derived from the HL (and the hLSB) Semi-Formal/ Strictly-Formal HL Hazard Log: List of identified hazards and its associated risk classification as well as information concerning the risk control Informal hLSB High Level Safety Backlog: list of requirements/ properties to be implemented inside the hM derived from the HL Informal/ Semi-Formal hM "Higher Model: model derived from srsM or another hM and used as an input for dM or another level of hM" Semi-Formal/ Strictly-Formal SSHA Subsystem Hazard Analysis: Safety Analysis of the openETCS subsystem and ist interfaces defined in the SSRS Informal/ Semi-Formal Subset-026 Subset 26 version 3.3.0 of the Control Command and Signalling Technical Specification of Interoperability of the trans-European rail system Informal Subset-088 Subset-088 version 2.3.0 ETCS Application Levels 1 and 2 - Safety Analysis Informal/ Semi-Formal Subset-091 Subset-091 version 3.2.0 Safety Requirements for the Technical Interoperability of ETCS in Levels 1 and 2 Informal PHA Preliminary Hazard Analysis of the System, which is mainly delivered based on subset-88 and subset-91 Informal Safety Goals General Safety Goal defined for the System mainly related to the accepted level of risk Informal/ Semi-Formal/Formal Safety Req Safety Requirements: list of all requirements which have to be respected during the system development to reach the safety goals Informal/ Semi-Formal

1.2 Safety activities

Abbreviation System Level Activies Degree of formalisation PHA + subset-26->SSHA Hazard Analysis of the Sub System mainly to identify relevant hazards Informal -> Informal/Semi-formal SSHA->HL Identifying all relevant risks in the subsystem and determining their risk and possible control activities Informal -> Informal/Semi-formal HL->SafetyReq Deriving safety requirements for the subsystem based on all relevant hazards and their associated risk controls Informal/Semi-formal -> Informal/Semi-formal SafetyReq->hLSB Transformation of all relevant requirements to the level of abstraction of the high level model Informal/Semi-formal -> Informal/Semi-formal SafetyReq->dMSB Transformation of all relevant requirements to the level of abstraction of the detailed Software model Informal/Semi-formal -> Semi-formal/Strictly-Formal SafeReq->CSB Transformation of all relevant requirements to the source code abstraction level Informal/Semi-formal -> Strictly-Formal hM/dM/C->HL Continuous hazard identification during the modelling and model analysis Informal/Semi-formal -> Informal/Semi-formal

Abbreviation Verification Activities Degree of formalisation hM->Safety Req/hLSB 1. Verification of the higher model against the high level safety requirements Informal -> Semi-formal/ Strictly-Formal dM->Safety Req/dMSB 2. Verification of the detailed model against the detail safety requirements Semi-formal/ Strictly-Formal -> Semi-formal/ Strictly-Formal C->Safety Req/CSB 3. Verification of code against the code safety requirements Semi-formal/ Strictly-Formal -> Strictly-Formal

Abbreviation Validation Activities Degree of formalisation C->HL 1. Validation of the implemented system against all identified hazards and their associated risk Semi-formal/ Strictly-Formal -> Semi-Formal/ Informal

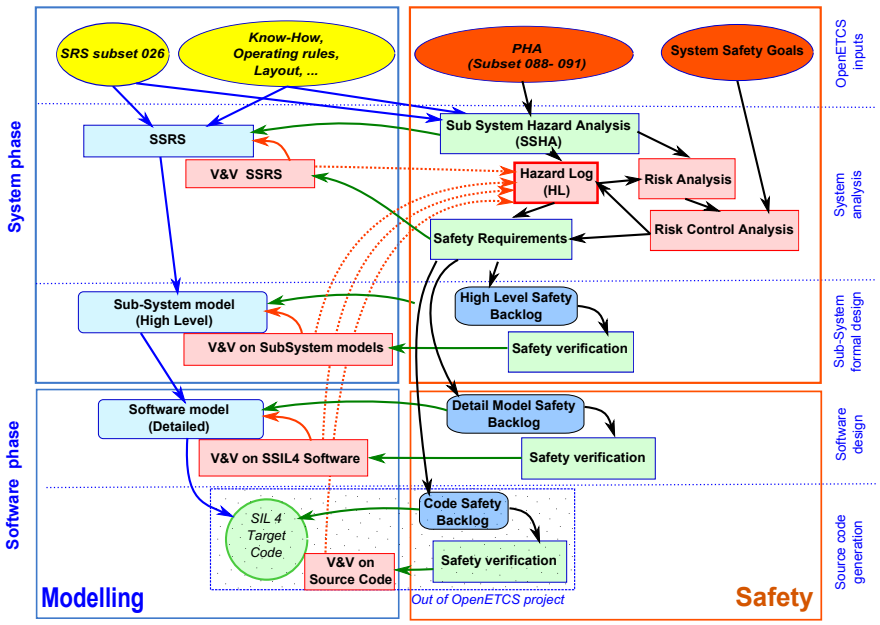

Figure 1. OpenETCS Safety Process

1.3 Tools for safety activities

2 Evaluation Criteria

2.1 Safety artifacts

2.2 Safety activities

2.3 Tools for safety activities

References