ITEA Office
High Tech Campus 69 - 3
5656 AG Eindhoven
The Netherlands

T + 31 88 003 6136
E info@itea3.org
W www.itea3.org

ITEA 3 is a EUREKA strategic ICT cluster programme

Exploitable Results by Third Parties

11025 openETCS

Project details

Project leader:	Klaus-Rüdiger Hase
Email:	klaus-ruediger.hase@deutschebahn.com
Website:	http://www.openetcs.org

Name: openETCS ETCS OBU model		
Input(s):	Main feature(s)	Output(s):
▪ ETCS requirements specification, primarily ERA subset-026	▪ Functional reference implementation of an ETCS onboard unit (OBU) based on ERA subset-026 ▪ Formalization of the ETCS OBU specification, i.e. ERA subset-026	▪ Reference OBU implementation, ETCS OBU code

Unique Selling Proposition(s):	▪ Provides an open source functional reference implementation of an ETCS OBU based on the ETCS requirements specification, Subset-026. ▪ As of December 2015 the model includes all the functionality needed to run on the Amsterdam-Utrecht ETCS line, which accounts for approximately 30% of Subset-026 and covers about 80 percent of the operational scenarios arising in practice).
Integration constraint(s):	▪ Requires SCADE Suite V16.1b (note that the model may be opened in “viewer mode” mode without a SCADE license)
Intended user(s):	▪ All railway related businesses and companies (operators, manufacturers, etc.), system designers, functional safety architects
Provider:	▪ openETCS consortium, Deutsche Bahn
Contact point:	▪ Klaus-Rüdiger Hase, DB Netz AG
Condition(s) for reuse:	▪ EUPL

Latest update: 30-11-2015

Name: openETCS generic API		
Input(s):	Main feature(s)	Output(s):
▪ ETCS requirements specification, ERA subset-026	▪ vendor independent and generic API of the ETCS onboard unit	▪ n/a

Unique Selling Proposition(s):	▪ Definition of a vendor independent and generic API of the ETCS OBU to improve the interoperability of ETCS equipment
Integration constraint(s):	▪ n/a
Intended user(s):	▪ All railway related businesses and companies (operators, manufacturers, etc.), system designers, functional safety architects
Provider:	▪ openETCS consortium, Deutsche Bahn
Contact point:	▪ Klaus-Rüdiger Hase, DB Netz AG
Condition(s) for reuse:	▪ EUPL
	Latest update: 30-11-2015

Name: Eclipse Safety Framewok (ESF)		
Input(s):	Main feature(s)	Output(s):
▪ UML models, from Papyrus, MagicDraw, etc.	▪ Perfom safety analysis on SysML or UML like models	▪ Reports (XML, HTML, PDF, DOC), Trees (OpenPSA)
Unique Selling Proposition(s):	▪ Provides a unique set of tools that enable both modelling and analysis of safety concerns, and allows a first-class interactivity between design and safety assessment activities. As this approach is based on models, each time the system model evolves, a new safety analysis can be done on the modified parts, and keeps the previous analysis on each unchanged component. This represents an important time-saving.	
Integration constraint(s):	▪ Java/Eclipse RCP	
Intended user(s):	▪ All companies needing MBSA (Model Based Safety Analysis)	
Provider:	▪ All4tec	
Contact point:	▪ Jonathan Dumont	
Condition(s) for reuse:	▪ EPL (Eclipse Public Licence)	

Name: Acceleo-based Code Generation		
Input(s):	Main feature(s)	Output(s):
▪ SysML Block Diagrams and State Charts	▪ Code generator prototype from SysML to SystemC for simulation	▪ SystemC class structure and state machine template

Unique Selling Proposition(s):	▪ Model-based approach, allows graphical specification, highly customisable
Integration constraint(s):	▪ Eclipse, SystemC, C++ Compiler
Intended user(s):	▪ System designers (Cross-Domain)
Provider:	▪ TWT
Contact point:	▪ Stefan Rieger
Condition(s) for reuse:	▪ EUPL

Name: SysML to Time Petri Net translator		
Input(s):	Main feature(s)	Output(s):
▪ SysML Activity Diagrams	▪ generation of time Petri Net models from SysML Activity Diagram for Model-Checking	▪ Petri Net using the syntax of the Tina tool (export to other model-checking tools is possible)

Unique Selling Proposition(s):	▪ Formal verification of SysML model with behavioral information that takes into account both timing-information and operation on structured data
Integration constraint(s):	▪ Eclipse
Intended user(s):	▪ functional safety architects
Provider:	▪ LAAS-CNRS, INPT
Contact point:	▪ Silvano Dal Zilio
Condition(s) for reuse:	▪ EUPL

Name: SysML to B Translator		
Input(s):	Main feature(s)	Output(s):
▪ SysML Block Diagrams (BDD, IBD) + Formal Annotation	▪ Generation of B project blueprint from SysML diagrams (structure, not behavior)	▪ B project (including formal annotations)

Unique Selling Proposition(s):	▪ Easier linking between system architects (not having a formal background) and safety critical software architects willing to use B Method for building the safety critical part of the software. Also application of Model Based Engineering approach.
Integration constraint(s):	▪ Eclipse
Intended user(s):	▪ Safety critical software architects
Provider:	▪ MERCE
Contact point:	▪ David Mentré
Condition(s) for reuse:	▪ EUPL

Name: CPN Verifier based on Transformation to Low Level Nets		
Input(s):	Main feature(s)	Output(s):
▪ Colored Petri Net in CPNTools Format ▪	▪ Formal verification of colored Petri Nets ▪ Transformation to low level nets for further analysis	▪ Counterexample ▪ Proof

Unique Selling Proposition(s):	▪ Formal verification of colored Petri nets with complex data types ▪ Simulation in CPNTools but verification with specialized and optimized tooling (e.g., the LoLA tool) improves the modeling workflow ▪ Early validation of system designs at high levels of abstraction ▪ Automated transformation to low-level nets
Integration constraint(s):	▪ Input CPNs are bounded and do not contain complex ML-expressions
Intended user(s):	▪ Modeling experts / system designers
Provider:	▪ TWT GmbH Science & Innovation
Contact point:	▪ Stefan Rieger (stefan.rieger@twt-gmbh.de)
Condition(s) for reuse:	▪ Tool available under EUPL upon request

Latest update: 16-11-2015

Name: TEST BENCH FOR EVC software		
Input(s):	Main feature(s)	Output(s):
▪ EVC code	▪ Is used to test the EVC on dedicated issues (balises, braking curves…)	▪ Test protocol

Unique Selling Proposition(s):	▪ Bench for connecting EVC code according to interfaces at application level
Integration constraint(s):	▪ Runs under LINUX OS
Intended user(s):	▪ Railways, railways suppliers, test houses
Provider:	▪ ERSA
Contact point:	▪ Matthieu Poirot, Patrick Deutsch
Condition(s) for reuse:	▪ EUPL

Latest update: 30-11-2015

Name: Qualification Plan		
Input(s):	Main feature(s)	Output(s):
▪ openETCS tool chain, CENELEC EN 50128	▪ Qualification plan for the openETCS tool chain (taking into account CENELEC EN 50128)	▪ Qualification plan
Unique Selling Proposition(s):	▪ Qualification necessary for industrial tool application	
Integration constraint(s):	▪ None	
Intended user(s):	▪ System designers, functional safety architects, tool certifiers	
Provider:	▪ SQS, TWT	
Contact point:	▪ Izaskun de la Torre, Stefan Rieger	
Condition(s) for reuse:	▪ EUPL	

Name: ETCS TEST MODELS		
Input(s):	Main feature(s)	Output(s):
	▪ SysML Models for testing ETCS speed monitoring functionality ▪ SysML Models for testing ETCS Radio Block functionality	
Unique Selling Proposition(s):	▪ Each model is linked to the requirements of the ETCS standard (SUBSET-026-3) ▪ Each model is available in various input formats for SysML tools Papyrus, Artisan Studio, Enterprise Architect ▪ Each model is available in readable HTML format	
Integration constraint(s):	▪ none ▪	
Intended user(s):	▪ ETCS specialists for Subset 076, Model-based testing specialists, MBT tool builders	
Provider:	▪ Jan Peleska, University of Bremen, Department of Mathematics and Computer Science	
Contact point:	▪ http://www.informatik.uni-bremen.de/agbs/testingbenchmarks/openETCS/ceiling-speed-monitoring/index_e.html	
Condition(s) for reuse:	▪ EUPL license conditions apply ▪ usage is free of charge	
	Latest update: 30-11-2015	

Name: Equivalence Class Testing Strategy for ETCS Speed Monitor		
Input(s):	Main feature(s)	Output(s):
▪ Test model for ETCS speed monitor	▪ Test strategy (algorithms) for input equivalence class partition testing ▪ Guaranteed fault detection properties implementations inside the fault domain ▪ High test strength for implementations outside the fault domain	▪ Test cases

Unique Selling Proposition(s):	▪ The testing strategy offers outstanding test strength with a manageable number of test cases ▪ Very well suited for software testing and HW/SW-integration testing
Integration constraint(s):	▪ None – it's just a method and associated algorithms
Intended user(s):	▪ ETCS test engineers, test tool builders
Provider:	▪ Jan Peleska, University of Bremen, Department of Mathematics and Computer Science
Contact point:	▪ Methods are described in ▪ Technical report http://www.informatik.uni-bremen.de/agbs/testingbenchmarks/openETCS/ceiling-speed-monitoring/testing_the_etcs_csm.pdf ▪ For algorithms, see journal article http://www.informatik.uni-bremen.de/agbs/testingbenchmarks/openETCS/ceiling-speed-monitoring/testing_the_etcs_csm.pdf ▪ For specific application to ETCS speed monitoring see conference paper http://www.informatik.uni-bremen.de/agbs/testingbenchmarks/openETCS/ceiling-speed-monitoring/testing_the_etcs_csm.pdf ▪ For test strength improvement for implementations outside fault domain, see http://link.springer.com/chapter/10.1007%2F978-3-319-21215-9_10
Condition(s) for reuse:	▪ Freely available – publications are subject to publisher's licensing conditions

Latest update: 30-11-2015

Name: Improvements for ETCS Subset 076		
Input(s):	Main feature(s)	Output(s):
	▪ Technical Report containing suggestions for improved test cases in ETCS specification, SUBSET 076, test cases related to speed monitoring	▪ Test cases
Unique Selling Proposition(s):	▪ It is explained why the present version of the ETCS SUBSET 076 test cases for the Ceiling Speed Monitor do not achieve full requirements coverage ▪ The missing test cases for achieving full requirements coverage are specified ▪ We show how a small number of test cases suffices to increase the test strength of the ETCS SUBSET 076 test cases related to the EVC Ceiling Speed Monitor in a considerable way	
Integration constraint(s):	▪ None – it's just a technical report and a testing method	
Intended user(s):	▪ ETCS testing specialists ▪ Standardization committee for ETCS SUBSET 076 ▪ Researchers in the field of model-based testing	
Provider:	▪ Jan Peleska, University of Bremen, Department of Mathematics and Computer Science ▪ To be submitted to Software Testing, Verification and Reliability Journal	
Contact point:	▪ jp@cs.uni-bremen.de	
Condition(s) for reuse:	▪ Freely available – publications are subject to publisher's licensing conditions	
	Latest update: 30-11-2015	

Name: RT-Tester RTT-MBT		
Input(s):	Main feature(s)	Output(s):
▪ Test models	▪ Model-based Testing for ETCS Applications	▪ Test cases and procedures for automated test execution ▪ Traceability data

Unique Selling Proposition(s):	▪ The model-based testing component RTT-MBT has integrated several algorithms optimized for testing ETCS EVC functionality ▪ RTT-MBT offers a very high degree of automation ▪ Test cases are automatically derived from SysML models ▪ Test procedures are automatically created by means of compile backends ▪ Traceability data linking requirements to test cases, procedures, and results is automatically produced
Integration constraint(s):	▪ RTT-MBT runs on Linux and Windows platforms
Intended user(s):	▪ Test engineers
Provider:	▪ Verified Systems International GmbH – www.verified.de
Contact point:	▪ info@verified.de
Condition(s) for reuse:	▪ Commercial license conditions apply for commercial use of RTT-MBT ▪ Academic licenses are available free of charge
	Latest update: 30-11-2015

Name: Systerel Smart Solver (S3)		
Input(s):	Main feature(s)	Output(s):
▪ Specifications ▪ C, Ada, SCADE model	▪ Formalization of properties & design ▪ Analysis of the system & creation of the results	▪ Proofs ▪ Counter-examples ▪ Scenarios ▪ Tests

Unique Selling Proposition(s):	▪ Proof of functional & structural properties with counter examples analysis ▪ Automatic test case generation ▪ Equivalence checking (design vs code, diversified codes)
Integration constraint(s):	▪ OS Linux
Intended user(s):	▪ Software designers, safety engineers, validators, verificators
Provider:	▪ Systerel - www.systerel.fr
Contact point:	▪ Nicolas Breton - nicolas.breton@systerel.fr
Condition(s) for reuse:	▪ Licensing
	Latest update: 20-11-2015