# Exploitable Results by Third Parties

## ITEA3 14004 ACOSAR

## Advanced Co-simulation Open System Architecture

**Project details**

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| | itea3.org/project/acosar.html |

| Name: DCP Specification Document | | |
|---|---|---|
| Input(s): | Main feature(s) | Output(s): |
| ▪ none | ▪ Communication Protocol Specification<br>▪ Default integration method | ▪ none |
| Unique Selling Proposition(s): | ▪ Distributed Co-simulation Protocol (DCP) for establishing open and distributed simulation architectures<br>▪ Significantly reduced integration effort<br>▪ Defined DCP slave behavior for flexible integration<br>▪ Specification aligned to FMI (Functional Mock-Up Interface) | |
| Integration constraint(s): | ▪ Version dependent support of features<br>▪ Current: DCP v1.0 Release Candidate 1 | |
| Intended user(s): | ▪ OEMs and suppliers from different sectors: Automotive, rail, maritime, aerospace, etc.<br>▪ Simulation tool and testing tool providers<br>▪ Research institutes | |
| Provider: | ▪ VIRTUAL VEHICLE Research Center<br>▪ www.acosar.eu (preliminary & v1.0 Release Candidate based) | |
| Contact point: | ▪ Martin Krammer – martin.krammer@v2c2.at | |
| Condition(s) for reuse: | ▪ Granted Modelica Association Project (MAP)<br>▪ Agreement of standard (initiated)<br>▪ DCP specification document will be published under Creative Commons BY-SA 4.0 license | |

*Latest update: 09.05.2018*

| Name: DCP Reference Implementation | | |
|---|---|---|
| **Input(s):** | **Main feature(s)** | **Output(s):** |
| ▪ DCP specification document<br>▪ (Non-) RT System | ▪ Reusable library implementing DCP<br>▪ Supports Windows and Linux OS | ▪ DCP compliant slaves<br>▪ Default master implementation |

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| Unique Selling Proposition(s): | ▪ Implementing the Distributed Co-simulation Protocol (DCP) specification for slaves and selected communication media<br>▪ Default master implementation<br>▪ Community-based development<br>▪ Fast adoption of specification |
| Integration constraint(s): | ▪ Current DCP v1.0 Release Candidate 1<br>▪ Based on C++ |
| Intended user(s): | ▪ Simulation tool providers<br>▪ Testing tool providers<br>▪ Research institutes |
| Provider: | ▪ VIRTUAL VEHICLE Research Center<br>▪ www.acosar.eu (preliminary & v1.0 Release Candidate 1 based) |
| Contact point: | ▪ Christian Kater – kater@sim.uni-hannover.de<br>▪ Martin Krammer – martin.krammer@v2c2.at |
| Condition(s) for reuse: | ▪ Part of the published part w.r.t. to a freely available Modelica Association originating standard (initiated)<br>▪ Source code and accompanying other data will be provided under BSD 2-clause license |

*Latest update: 09.05.2018*

| Name: DCP Test Suite Concept | | |
|---|---|---|
| Input(s): | Main feature(s) | Output(s): |
| ▪ DCP specification | ▪ Fully specified DCP test suite, defining specification dedicated tests | ▪ Test suite |
| Unique Selling Proposition(s): | ▪ Test suite concept targeting Distributed Co-simulation Protocol (DCP) v1.0 Release candidate 1 <br> ▪ Enables testing of different, diverse implementations <br> ▪ Significantly reduced integration efforts through front-loaded testing prior to integration | |
| Integration constraint(s): | ▪ Implemented DCP tester according to (1) DCP 1.0 Release candidate 1 specification and (2) DCP test suite concept | |
| Intended user(s): | ▪ All DCP implementing providers and integrators | |
| Provider: | ▪ VIRTUAL VEHICLE Research Center <br> ▪ www.acosar.eu (preliminary & v1.0 Release Candidate based) | |
| Contact point: | ▪ Christian Kater – kater@sim.uni-hannover.de <br> ▪ Martin Krammer – martin.krammer@v2c2.at | |
| Condition(s) for reuse: | ▪ Freely available Modelica Association Standard (initiated) <br> ▪ DCP Specification will be published under CC-BY-SA <br> ▪ Source code or other data will be provided under BSD 2-Clause license | |
| | *Latest update: 09.05.2018* | |

| Name: Diverse DCP Implementations | | |
|---|---|---|
| **Input(s):** | **Main feature(s):** | **Output(s):** |
| <ul><li>DCP specification</li><li>Company specific tools and systems</li><li>(non-) RT systems</li></ul> | <ul><li>Common communication protocol</li><li>Distributed Co-Simulation</li></ul> | <ul><li>Interoperable systems and services</li></ul> |
| Unique Selling Proposition(s): | <ul><li>Distributed Co-simulation Protocol (DCP) for establishing open distributed and open system simulation architectures</li><li>Common communication protocol</li><li>Significantly reduced integration effort</li></ul> | |
| Integration constraint(s): | <ul><li>Interfaces implemented according to DCP v1.0 Release Candidate 1</li><li>Providers support different communication mediums</li><li>CAN, UDP, USB, Bluetooth are specified; the DCP specification was written with extensibility in mind:<br>(1) native and non-native specification<br>(2) communication medium dependent and independent parts of specification</li></ul> | |
| Intended user(s): | <ul><li>OEMs and suppliers within the different industry sectors: Automotive, rail, maritime, aviation, etc.</li><li>Simulation tool providers</li><li>Testing tool providers</li></ul> | |
| Provider: | <ul><li>Individual companies; AVL, dSPACE, ETAS, TWT, ESI-ITI, MicroNova, Siemens</li></ul> | |
| Contact point: | <ul><li>(AVL) Josef Zehetner – josef.zehetner@avl.com</li><li>(dSPACE) Stefan Walter – swalter@dspace.de</li><li>(ETAS) Natarajan Nagarajan – natarajan.nagarajan@etas.com</li><li>(ESI-ITI) Torsten Blochwitz – torsten.blochwitz@esi-group.com</li><li>(MicroNova) Stefan Ewald – stefan.ewald@micronova.de</li><li>(Siemens) Bruno Loyer – bruno.loyer@siemens.com</li><li>(TWT) Christian König – christian.koenig@twt-gmbh.de</li><li>(LUH) Christian Kater – kater@sim.uni-hannover.de</li></ul> | |
| Condition(s) for reuse: | <ul><li>Individual and tool provider dependent licensing schemes applied</li></ul> | |

*Latest update: 09.05.2018*

| Name: Physical Converter Module (PCM) | | |
|---|---|---|
| **Input(s):** | **Main feature(s)** | **Output(s):** |
| <ul><li>DCP specification</li><li>PCM hardware</li><li>DCP reference implementation</li></ul> | <ul><li>DCP compliant RT system interfacing</li><li>Use of DCP supported protocols</li></ul> | <ul><li>Accessible cyber physical systems</li></ul> |
| Unique Selling Proposition(s): | <ul><li>Smart device for integration of various different components, e.g. sensors, actuators, software</li><li>Interfacing legacy systems</li><li>X-2-DCP Gateway Module</li></ul> | |
| Integration constraint(s): | <ul><li>Connection to a supported network</li><li>CAN, UDP, USB, Bluetooth are specified; to be extended</li><li>Interfaces implemented according DCP v1.0 Release Candidate 1</li></ul> | |
| Intended user(s): | <ul><li>OEMs and suppliers within the different industries: Automotive, rail, maritime, aviation, etc.</li><li>Simulation tool providers</li><li>Testing tool providers</li></ul> | |
| Provider: | <ul><li>Spath Micro Electronic Design GmbH</li><li>Reininghausstraße 13, A-8020 Graz</li></ul> | |
| Contact point: | <ul><li>Werner Mair – w.mair@meds.at</li></ul> | |
| Condition(s) for reuse: | <ul><li>Agreement for distribution to be negotiated</li></ul> | |

*Latest update: 09.05.2018*

| Name: Integration Methodology | | |
|---|---|---|
| Input(s): | Main feature(s) | Output(s): |
| <ul><li>DCP specification document</li><li>DCP slave descriptions</li><li>Systems engineering software tool</li><li>Add-in</li><li>SysML profile</li></ul> | <ul><li>Translation of DCP principles to systems modeling domains</li><li>Specification of DCP slaves by modeling approach</li><li>Integration of DCPX files to DCP scenarios</li></ul> | <ul><li>DCP scenario export for master configuration roll-out and simulation control</li></ul> |
| Unique Selling Proposition(s): | <ul><li>Model based systems engineering approach for DCP integration</li><li>SysML model and diagrams</li><li>Model checking approach for consistency and completeness of resulting DCP slave description and DCP scenario description</li><li>Export and import of DCP slave descriptions</li><li>Export of DCP scenario descriptions</li><li>Application of further MBSE concepts to DCP, e.g. variant management, versioning, reuse, etc.</li><li>Integration and reuse of co-simulation scenarios</li></ul> | |
| Integration constraint(s): | <ul><li>DCP slave description up to DCP specification 1.0 release candidate 1</li></ul> | |
| Intended user(s): | <ul><li>DCP integrators and DCP slave providers</li><li>Research companies</li></ul> | |
| Provider: | <ul><li>VIRTUAL VEHICLE Research Center</li></ul> | |
| Contact point: | <ul><li>Martin Krammer – martin.krammer@v2c2.at</li></ul> | |
| Condition(s) for reuse: | <ul><li>Agreement or license for distribution to be negotiated.</li></ul> | |

*Latest update: 09.05.2018*