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ITEA 3 is a EUREKA strategic ICT cluster programme

Exploitable Results by Third Parties

ITEA2 13040 IDEaliSM

Integrated & Distributed Engineering Services framework for MDO

Project details

Project leader:	Stefan van der Elst
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Website:	www.idealism.eu

Name: IDEaliSM framework architecture application		
Input(s):	Main feature(s)	Output(s):
▪ current status of the company's product development process	▪ provides a general blueprint to support the implementation and use of a distributed framework for Multidisciplinary Design and Optimization (MDO) ▪ back-end technologies build upon a set of engineering services ▪ enables utilizing a collaborative and distributed service-oriented process methodology to reduce development cost and lead-time within the product development process	▪ structured setup of a novel product development process enabling the efficient connection of multiple centres of competence within and outside companies using and efficient MDO process
Unique Selling Proposition(s):	▪ offers a complete model to setup, maintain and extend to a distributed execution environment for MDO workflows consisting of a multitude of engineering services ▪ independent of industry: can be applied to any industry, proven in the aerospace and automotive industries. ▪ supports the integration and interoperability of engineering services and existing tools/services ▪ enhances collaboration across multiple-sites and enables exchange of data across company borders ▪ provides support for standards to strengthen data exchange, sharing and archiving (ISO10303 – STEP), as well as facilitates modelling using open standards like UML and VEC including formats like CPACS ▪ eliminates labor-intensive and error-prone manual tasks ▪ no vendor lock-in: the architecture is modular and flexible in connecting and utilizing different tools independent of specific industry tools	
Integration constraint(s):	▪ depending on the level of implementation, a set of software titles needs to be installed (either open-source or commercial software, or a combination of the both) ▪ the principle of the framework architecture allows for application of a flexible subset of software titles and can be combined with existing software within the company	
Intended user(s):	▪ various industries and research communities aiming to shift to an advanced collaborative and distributed product development process with higher cost-efficiency and shorter time-to-market	
Provider:	▪ all partners of the IDEaliSM project	
Contact point:	▪ Stefan van der Elst - stefan.vanderelst@ke-works.com ▪ Erwin Moerland - erwin.moerland@dlr.de	

Name: IDEaliSM framework architecture application	
Condition(s) for reuse:	▪ ▪

Latest update: 04.10.2017

Name: Hybrid workflow system (Optimus - KE-Chain)		
Input(s):	Main feature(s)	Output(s):
▪ workflow components definition	▪ bidirectional coupling between KE-works' KE-chain and Noesis Optimus ▪ seamlessly integration of manual activities with automated simulation and optimization workflows	▪ workflow execution results

Unique Selling Proposition(s):	▪ strengthens integration between engineers and tools in MDO problems ▪ coupling of both components via web technology web-sockets ▪ execute simulation and optimization workflows on a dedicated server from any location using the web - based portal of the business process, KE-chain ▪ making powerful and local tools available to a larger team or community (no-location) ▪ supports formalization and streamlining of processes explicitly ▪ eliminate labor-intensive and error-prone manual tasks
Integration constraint(s):	▪ online availability and connectivity between the platforms (KE-chain and Noesis Optimus)
Intended user(s):	▪ end-users from industry wishing to execute engineering workflows from KE-chain by enabling the workflow powers from an industrial strength execution platform
Provider:	▪ KE-works, Delft, Netherlands, www.ke-works.com ▪ Noesis Solutions N.V., Leuven, Belgium, www.noesissolutions.com
Contact point:	▪ KE-works, Stefan van der Elst - stefan.vanderelst@ke-works.com ▪ Noesis Solutions N.V., Roberto d'Ippolito - roberto.dippolito@noesissolutions.com
Condition(s) for reuse:	▪ commercial or Research License to KE-chain ▪ commercial License to Optimus
	Latest update: 05.09.2017

Name: CPACS data schema for streamlining data exchange within conceptual and preliminary aircraft design		
Input(s):	Main feature(s)	Output(s):
▪ requirements ▪ product data (geometrical) ▪ analysis results (e.g. aerodynamic performance, engine performance, trajectories, etc.) ▪ process information	▪ the Common Parametric Aircraft Configuration Schema provides a structure for exchanging product and process information between engineering services within aircraft design ▪ corresponding interfacing and geometry libraries allow the creators of engineering services as well as simulation workflow experts to easily obtain relevant information from the data format	▪ relevant geometrical information ▪ relevant analysis results of dependent engineering services both in a standardized, parametrized and easily accessible context.

Unique Selling Proposition(s):	▪ offers a parameterized data format fitting conceptual and preliminary aircraft design ▪ de-facto scheme for the exchange of data being utilized within the MDO community in aerospace design ▪ leads to a reduction of the amount of interfaces between engineering tools and services applied in aircraft design ▪ standardizes interfaces between engineering services, leading to a reduction in (manual) data re-formatting errors ▪ forms a basis for communication between heterogeneous experts involved in the aircraft design process
Integration constraint(s):	▪ the CPACS scheme is currently provided as XML schema definition (*.xsd) document ▪ the corresponding libraries for interfacing (xml interface, geometry library) are provided as dynamic link libraries (*.dll) in conjunction with API's for C, C++, Python, Java, MATLAB, and FORTRAN
Intended user(s):	▪ aircraft design application developers, conceptual and preliminary aircraft design engineers within research and industry
Provider:	▪ German Aerospace Center (DLR), Hamburg, Germany ▪ Landing page for CPACS and its libraries: http://www.cpacs.de
Contact point:	▪ Erwin Moerland - erwin.moerland@dlr.de
Condition(s) for reuse:	▪ free open-source license
	Latest update: 29.09.2017

Name: Optimus simulation workflow cloudification		
Input(s):	Main feature(s)	Output(s):
▪ software platform for cloud computing ▪ cloud orchestrator engine ▪ Optimus workflow with capabilities to be run in parallel	▪ cloudification of simulation workflows of Optimus ▪ deployment of workflows on virtualized computational infrastructures such as within local Clouds or over broader, web based, infrastructure	▪ private or public cloud infrastructure tailored on the specific needs of the simulation workflow

Unique Selling Proposition(s):	▪ easy access through web-based technologies ▪ automatic and user friendly configuration of the chosen infrastructure's components for a best fit for the needs of the simulation workflow to be executed ▪ workflow cloudification tool developed by KU Leuven will automatically configure the computational infrastructure and optimize it for the specific workflow ▪ provides a more affordable, easier and earlier access to high performance computing infrastructure ▪ provides better performance ▪ improves adoption of true MDO in industry ▪ minimizes distance from data to deployed application
Integration constraint(s):	▪ ▪
Intended user(s):	▪ industries with design processes that entails computationally expensive analysis tools ▪ analysis tools should be scalable on a parallel environment
Provider:	▪ Noesis Solutions N.V., Leuven, Belgium, www.noesissolutions.com ▪ DistriNet, KU Leuven, Leuven, Belgium, distrinet.cs.kuleuven.be
Contact point:	▪ Noesis Solutions N.V., Roberto d'Ippolito - roberto.dippolito@noesissolutions.com ▪ DistriNet, KU Leuven, Bert Lagaisse, bert.lagaisse@cs.kuleuven.be
Condition(s) for reuse:	▪ commercial license

Latest update: 04.10.2017

Name: Wire harness modularized framework		
Input(s):	Main feature(s)	Output(s):
▪ Design Language based on UML ○ geometry ○ electrical schematic ○ master data	▪ 3D wire harness software suite consisting of modules for ○ 3D path finding ○ routing ○ physics simulation	▪ harness formats: ○ VEC, KBL ▪ Geometry: ○ STEP, STL, VTK

Unique Selling Proposition(s):	▪ automatic 3-dimensional path finding, best (shortest) path to route individual wires on the topology network and finally harness segment smoothing (according to their physical properties and restrictions) to get a physically realistic harness layout by considering aspects such as gravity, bend radii and wire harness bundle stiffness ▪ conform to VEC standard ▪ generally applicable to various wire harness use-cases ▪ reduces lead-time
Integration constraint(s):	▪ Java 8 (or newer) ▪ Eclipse
Intended user(s):	▪ applicable to any kind of industry having a need of automated wire harness generation
Provider:	▪ IILS Ingenieurgesellschaft für Intelligente Lösungen und Systeme mbH, Leinfelden-Echterdingen, Germany, www.iils.de
Contact point:	▪ Roland Weil - weil@iils.de
Condition(s) for reuse:	▪ commercial license

Latest update: 05.09.2017

Name: RCE-EDMopenSimDM interfaces		
Input(s):	Main feature(s)	Output(s):
▪ cloud (or local) instance of an EDMopenSimDM server ▪ RCE process integration software ▪ the interfaced tools require initial product / system design data (e.g. CAD files in ISO 10303 – STEP, aircraft designs in CPACS etc)	▪ interface between DLR's Remote Component Environment (RCE) process integration software and Jotne's EDMopenSimDM (based on ISO 10303 – STEP)	▪ capability to automatically operate with the remote server directly from RCE ▪ the interfaced tools will provide optimized design data under configuration control with standard compliant storage

Unique Selling Proposition(s):	▪ allows users to connect and use services provided by EDMopenSimDM from Jotne from within the simulation workflows ▪ provides an automated interface to access data management, exchange and archiving functionalities from within the RCE tool ▪ offers an integrated solution to standard compliant data storage ▪ enables a large number of simulations or experiments to be performed and tracked
Integration constraint(s):	▪ flexible integrations delivered via normal web services ▪ normal operating systems and hardware currently in use in business acceptable
Intended user(s):	▪ various industries, including aerospace, aiming for enhanced multi-disciplinary design optimization capability across the supply chain, collaborating using open standard formats under configuration control
Provider:	▪ Jotne EPM Technology, Oslo, Norway, www.jotne.no ▪ German Aerospace Center (DLR), Hamburg, Germany, www.dlr.de
Contact point:	▪ Jotne EPM Technology, Kjell Bengtsson - kjell.bengtsson@jotne.com ▪ German Aerospace Center (DLR) – erwin.moerland@dlr.de
Condition(s) for reuse:	▪ commercial licence

Latest update: 04.10.2017

Name: Optimus-EDMopenSimDM interfaces		
Input(s):	Main feature(s)	Output(s):
▪ cloud (or local) instance of an EDMopenSimDM server ▪ Optimus workflow ▪ the interfaced tools require initial product / system design data (e.g. CAD files in ISO 10303 – STEP, aircraft designs in CPACS etc)	▪ interface between Noesis' Optimus and Jotne's EDMopenSimDM (based on ISO 10303 – STEP)	▪ capability to automatically operate with the remote server directly from the simulation workflow ▪ the interfaced tools will provide optimized design data under configuration control with standard compliant storage

Unique Selling Proposition(s):	▪ allow users to connect and use services provided by the Open EDMopenSimDM from Jotne from within the simulation workflows ▪ provides easy and user friendly interface and GUI to access data management, exchange and archiving functionalities from within the Optimus tool ▪ offers an integrated solution to standard compliant data storage ▪ enables a large number of simulations or experiments to be performed and tracked
Integration constraint(s):	▪ Flexible integrations delivered via normal web services ▪ Normal operating systems and hardware currently in use in business acceptable.
Intended user(s):	▪ industries that makes (or intend to make) use of a central data storage and need to automate the exchange of data with the simulation process layer
Provider:	▪ Noesis Solutions N.V., Leuven, Belgium, www.noesissolutions.com ▪ Jotne EPM Technology, Oslo, Norway, www.jotne.no
Contact point:	▪ Noesis Solutions N.V., Roberto d'Ippolito - roberto.dippolito@noesissolutions.com ▪ Jotne EPM Technology, Kjell Bengtsson - kjell.bengtsson@jotne.com
Condition(s) for reuse:	▪ commercial licence

Latest update: 05.10.2017

Name: InFoRMA (MDO advisor)		
Input(s):	Main feature(s)	Output(s):
▪ N2 chart of the problem ▪ list of coupling variables, design variables, constraints and objective function	▪ helps in formulating, formalizing and executing MDO problem rapidly ▪ advises the user on the selection of an appropriate MDO advisor	▪ problem visualization using XDSM ▪ advice on architecture to be used ▪ formalized MDO problem that can be executed using PIDO tool
Unique Selling Proposition(s):	▪ support both experienced and inexperienced MDO users to describe the problem at hand, and obtain in return a list of suitable MDO architectures and their associated simulation workflow implementations in Optimus ▪ operates based on a set of input criteria and the knowledge stored in the knowledge base and displays the architecture representations in the form of XDSMs ▪ lead-time reduction (90%) in setting up MDO architectures ▪ lowering the barrier to start implementing MDO	
Integration constraint(s):	▪ Java ▪ Eclipse	
Intended user(s):	▪ teams/organizations requiring MDO in their design process. It is suitable for teams not having a deep understanding of MDO	
Provider:	▪ TU Delft, Delft, Netherland, www.lr.tudelft.nl ▪ Noesis Solutions N.V., Leuven, Belgium, www.noesissolutions.com	
Contact point:	▪ TU Delft, Gianfranco La Rocca - g.larocca@tudelft.nl ▪ Noesis Solutions N.V., Roberto d'Ippolito - roberto.dippolito@noesissolutions.com	
Condition(s) for reuse:	▪	
	Latest update: 05.09.2017	

Name: Composite structures optimization strategy		
Input(s):	Main feature(s)	Output(s):
▪ Optimus workflow embedding the parametrized CAD model and the CAE analysis related to a composite structure design ▪ set of design rules taking into account manufacturing constraints ▪ strength and stiffness requirements	▪ algorithm to optimize the fiber orientation and the stacking sequence of the composite materials	▪ optimized thickness and layout of the laminate for a composite structure

Unique Selling Proposition(s):	▪ drastic reduction of the lead time of the designing process ▪ possibility to obtain a lighter composite structure in a reduced time
Integration constraint(s):	▪ ▪
Intended user(s):	▪ industries operating in the design and manufacturing of composite material structures
Provider:	▪ Noesis Solutions N.V., Leuven, Belgium, www.noesissolutions.com
Contact point:	▪ Noesis Solutions N.V., Roberto d'Ippolito - roberto.dippolito@noesissolutions.com
Condition(s) for reuse:	▪ commercial license

Latest update: 04.10.2017

Name: Stiffness calculation of wire harnesses		
Input(s):	Main feature(s)	Output(s):
▪ harness formats: o VEC	▪ stiffness calculation of wire harness segments	▪ harness formats: o VEC
Unique Selling Proposition(s):	▪ a suitable method for the stiffness calculation of cable harness segments ▪ simulation of flexible structures ▪ interfaces to 3D wire harness software suite and Optimus ▪ output data can be used to parametrise laying simulations ▪ the numerical simulation approach is validated with experimentally determined data ▪ generally applicable to various wire harness use-cases ▪ reduces prototypes	
Integration constraint(s):	▪ other commercial software dependencies (Optimus, ANSYS)	
Intended user(s):	▪ applicable to automotive, aerospace and other industry ▪ usage of wire harnesses and other flexible structures	
Provider:	▪ Fraunhofer Institute for Structural Durability and System Reliability LBF, Bartningstr. 47, 64289 Darmstadt, Germany	
Contact point:	▪ Christoph Tamm – christoph.tamm@lbf.fraunhofer.de	
Condition(s) for reuse:	▪ commercial license (planned)	
	Latest update: 04.10.2017	

Name: Open Source KE-chain Python API (pykechain)		
Input(s):	Main feature(s)	Output(s):
▪ Python 2.7, 3.4 (or newer) or Jupyter Notebooks ▪ KE-chain 2 scope and user account	▪ programmatic coupling between python script and the KE-chain instance ▪ seamlessly programmatic control of all aspects of a KE-chain scope	▪ updated KE-chain 2 project ▪ pykechain enabled script

Unique Selling Proposition(s):	▪ provides programmatic control of KE-chain 2 ▪ controls all aspects of a KE-chain 2 project such as: creating models and part instances, altering the data model, updating part data, uploading attachments, creating, altering and deleting activities, sub-processes, configuring activities, setting assignees to activities, altering the custom activity views and many other aspects of KE-chain 2 ▪ with Jupyter Notebooks a web-based engineering science programming platform is provided that can seamlessly interact with KE-chain to perform data analysis, trend analysis, A.I. integration or optimization runs, results, including graphical results (e.g. through matplotlib), can be uploaded to KE-chain directly and visualized directly ▪ eliminate labor-intensive and error-prone manual tasks and strengthens integration between engineers and tools in Engineering Design problems ▪ making powerful and local tools available to a larger team or community (no-location) ▪ in combination with the KE-chain automation (SIM) module, and the Hook system, pykechain scripts can be hosted, managed and launched on demand or manually on the platform itself. No local python installation on the desktop of the engineer is needed. ▪ pykechain is open source and officially supported through KE-chain support
Integration constraint(s):	▪ availability of KE-chain 2 ▪ knowledge of Python or Jupyter Notebooks
Intended user(s):	▪ end-users from industry wishing to extend KE-chain with powerful automation features KE-chain
Provider:	▪ KE-works, Delft, Netherlands, www.ke-works.com
Contact point:	▪ KE-works, Stefan van der Elst – stefan.vanderelst@ke-works.com
Condition(s) for reuse:	▪ commercial or research license to KE-chain 2 ▪ pykechain is provided under the Apache Software License v2.0

Latest update: 9.10.2017