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STS 11

Integration and Use of Material and Process Modelling for Decision Making

Chairs: Carlo Poloni, Carlos Kavka, Alesandro Segatto, Borek Patzak[2], Salim Belouettar[3]

[1] ESTECO SpA, 34149 Trieste, Italy, poloni@esteco.com, kavka@esteco.com , segatto@esteco.com
[2] CVUT - Czech Technical University, 160 00 Prague 6, Czech Republic borek.patzak@fsv.cvut.cz
[3] Luxembourg Institute of Science and Technology, salim.belouettar@list.lu

Session Abstract

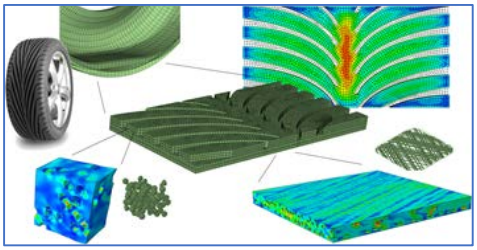
Keywords: Computational materials and structure design, business process modelling and design, decision support system, interoperability, model selection, material and process selection, data and metadata

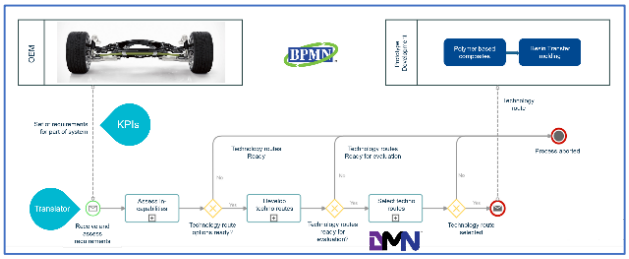
Decision making process is a knowledge and data intensive process, with modelling, data and knowledge playing a significant role in speeding up and effecting decisions. As the pace of digital transformation, industries need to use more than ever modelling and simulation for decision-making. In this context, capturing, managing, and reusing of decision related knowledge such as company business processes, alternatives, parameters, constraints, goals, dependencies, and the design process in the design of complex material and manufacturing systems is an effective way for providing effective decision support.

This STS aims to provide a forum for presenting and discussing recent advances and challenges related to the integration of material and process modelling in decision-making. This includes:

- Modelling and Simulation frameworks for decision making supporting interoperability for modelling linked and coupled physical phenomena, which will make the integration of different types models and the development of workflows much faster and less error prone.
- Interoperability and Metadata, data structures, schemas and associated metadata to guarantee interoperability among different materials modelling components as well as to support knowledge management across materials modelling data and business data, or LCE models.
- Model selection and model adaptivity for decision-making.
- Integration of materials models with structured and unstructured data for decision-making and techniques for efficient exploration of multi-level design spaces.
- Multidisciplinary design optimization, considering different approaches and methodologies that account for performance while combining tools to estimate the profitability of designed products.
- Business Decision Workflows and Business Requirements using the Business Process Models and standards therefore providing the missing link between business processes and materials science/engineering workflows. This includes the creation of use-case scenarios and analysis and development of algorithms to enable KPIs-based business decisions.

The session will host industrial application from the Horizon 2020 Composelector project in the transport industry (automotive and aerospace), where complex composite materials need to be considered for performance, availability and lifecycle.





The following papers will be presented in this STS 11:

COMPOSELECTOR: A Material Modelling and Data-Driven Empowered Business Decision Support System (DSS)
Salim Belouettar, Luxembourg Inst. of S&T, Carlos Kavka, Alessandro Segato, ESTECO SpA, Trieste, Hein Koelman, Koelman Consulting

MuPIF: Open Distributed Simulation Platform
Bořek Patzák, Vít Šmilauer, Martin Horák, Stanislav Šulc, Edita Dvořáková, CVUT, Prague, Czech Republic

A Business Decision Support System Supporting Early Stage Composites Part Design
Hein Koelman, Koelman Consulting, Tom A.M. Verbrugge, DOW Belgium, Dario Campagna, Carlos Kavka, Alessandro Segato, ESTECO SpA, Trieste, Italy, Salim Belouettar, Luxembourg Inst. of S&T

A Standard Approach for Decision Making in Materials and Process Selection
Carlos Kavka, Alessandro Segatto, Dario Campagna, Mattia Milleri, Alan Del Piccolo, ESTECO, Trieste, Italy, Astrid Soumoy, Polytechnique de Montréal

System Models Simulation Process Management and Collaborative Multidisciplinary Optimization
Carlo Poloni, ESTECO SpA and Univ. of Trieste, Trieste, Italy