# CEN

# WORKSHOP

# AGREEMENT

# CWA 17960

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English version

# ModGra - a Graphical representation of physical process models

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## European foreword

This CEN Workshop Agreement (CWA 17960:2022) has been developed in accordance with the CEN-CENELEC Guide 29 "CEN/CENELEC Workshop Agreements – A rapid prototyping to standardization" and with the relevant provisions of CEN/CENELEC Internal Regulations - Part 2. It was approved by a Workshop of representatives of interested parties on 2022-11-10, the constitution of which was supported by CEN following the public call for participation made on 2022-06-08. However, this CEN Workshop Agreement does not necessarily include all relevant stakeholders.

The final text of this CEN Workshop Agreement was provided to CEN for publication on 2022-11-22.

The following organizations and individuals developed and approved this CEN Workshop Agreement:

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# Introduction

Models, seen as a surrogate of a real-world object/entity's behaviour, play a central role in science and engineering. They stand at the root of innovation through research and development, thereby taking a pivotal role in the evolution of society.

Products are the result of processing materials, and with products covering the entire range, the disciplines actively pursuing the generation of process models are very wide. With different disciplines working together, communication is essential, and there is a need to agree on a common language.

The MODA standard has taken the first step. Here we want to refine the representation of the model, providing a graphical standard that is simple but sufficiently rich to capture the nature of a physical process. The visual language captures the process's main characteristics, serving as a tool for discussing, designing and documenting dynamic, multi-scale processes.

It consists of a small number of components, making it a tool for modellers both from academia and industry.

Modelling is a highly knowledge-intensive activity, and engineering and scientific actions cover a wide range of contexts, from process engineering to manufacturing and materials & product engineering.

Their documentation represents a notorious problem in science and technology.

The industrial and academic R&D communities are the target group being active in materials, chemical manufacturing, consumer goods, electronics, energy production and storage, and bio-processes.

# 1 Scope

The planned Workshop establishes a common graphical representation for multi-scale process models. It covers models of physical processes, including control components that capture the model control structure, the model's logic and the physical process control.

The simplicity of the graphical language leads to efficient communication, especially for industrial end-users to understand and lower the barrier to utilising multiscale process modelling. It also aims to define a minimal set of basic building blocks that is rich enough to capture the various models on any level of complexity, including the model controls.

The graphical language ModGra provides systematic documentation of process models limited to capturing the process's temporary behaviour and spatial characteristics. No attempt is made to provide a comprehensive mathematical description. Instead, the mathematical input/output behaviour of the language's fundamental entities is given only on the top level, as detailed applications are achieved by additional assumptions, which are hard to systematise due to their highly specialised application.

# 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CWA 17284:2018, *Materials modelling - Terminology, classification and metadata*

# 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at https://www.electropedia.org/

**3.1**
**Capacity**
Capacity holds tokens. It represents the model for a single object/entity.

**3.2**
**Capacity spatial characteristics**

— A capacity may be:

— uniform; the relevant characteristics are not a function of the spatial position.

— distributed, the relevant characteristics are a function of the spatial position. Distribution effects may be in 1-3 spatial dimensions.

— Size may be:

— infinite large

— finite