# Fifth International Workshop on Multi-Paradigm Modeling for Cyber-Physical Systems – MPM4CPS'23

**1 – 3 October 2023 – Satellite event at MODELS 2023, Västerås, Sweden**
http://msdl.uantwerpen.be/conferences/MPM4CPS/2023/

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## Scope of the Workshop

Tackling the complexity involved in developing truly complex, designed systems is a topic of intense research and development. System complexity has drastically increased once software components were introduced in the form of embedded systems, controlling physical parts of the system, and has only grown in CPS, where the networking aspect of the systems and their environment are also considered. The complexity faced when engineering CPS is mostly due to the plethora of cross-disciplinary design alternatives and inter-domain interactions. To date, no unifying theory or system design methods, techniques, or tools to design, analyze, and ultimately deploy CPS exist. Individual (physical systems, software and network) engineering disciplines offer only partial solutions and are no match for the complexity observed in CPS. Multi-Paradigm Modeling (MPM) offers a foundational framework for gluing the several disciplines together in a consistent way. The inherent complexity of CPS is broken down into different levels of abstraction and views, each expressed in appropriate modeling formalisms. MPM offers processes and tools that can combine, couple, and integrate each of the views that compose a system.

MPM encompasses many research topics - from language engineering (for DSLs, including their (visual) syntax and semantics), to processes to support multi-view and multi-abstraction modeling, simulation for system analysis, and deployment. The added complexity that CPS brings compared to embedded and software-intensive systems requires looking at these new applications and how MPM techniques can be applied or adapted to them, tying together multiple domains. Many remaining research questions require answers from researchers in different domains, as well as a unified effort from researchers that work on supporting techniques and technologies.

## Topics of Interest (including, but not limited to)

- **Foundations of domain-specific modelling**, with a particular focus on classifications of the various dimensions around MPM (formalisms; processes; related activities such as V&V, deployment, calibration, etc.; tools, and methodologies);
- **Modelling language engineering**, modular design of modelling languages, with a particular focus on de-/composition;
- **Co-simulation**, coordination algorithms ensuring correct simulation results.
- **Model Management** with, and for, MPM4CPS: challenges, techniques, tools.
- **Applications of MPM techniques** in automotive, aviation, manufacturing, etc.
- **MPM for (self-)adaptive systems**
- **MPM approaches, techniques and tools** for related domains: IoT, Digital Twins, SmartCPS
- **Social impacts** processes in CPS, Large Data Management Modelling in CPS

Contributions should clearly address the foundations of Multi-Paradigm Modeling by demonstrating the use of models to achieve the stated objectives and discuss the benefits of explicit modeling.

## Important Dates

**Paper submission deadline:** 17 July 2023
**Notification of acceptance:** 15 August 2023
**Workshop dates:** 1 -3 October 2023 (exact date TBA)

## Submission Procedure

Papers should be submitted electronically in PDF using the ACM formatting instructions available here via EasyChair for one of the following topics. Each submission will be peer-reviewed by at least three PC members.

- **Full research papers** (10 pages max) present a novel, innovative approach;
- **Exemplar descriptions** (10 pages max) describing a CPS Engineering practice, highlighting both the processes at play and the formalisms, languages and/or tools used to support these activities, all expressed using the language described in the Workshop's webpage.
- **Short papers** (5 pages max) present new ideas or early-stage research, extensively discuss the experiences of the researchers with an MPM approach or demonstrate a tool;

All papers will be published with the main conference's workshop proceedings; authors submitting exemplars will eventually be invited to contribute to a Special Issue.