

# Exporting to External Simulation Models

## Introduction

Systems engineers coordinate the work of multiple other engineering disciplines (mechanical, material, electrical, control, and so on), requiring information to flow between systems engineers and those in other disciplines. Systems engineering information intentionally does not cover all disciplines, but must integrate with them to enable systems engineers to communicate with other engineers. Using discipline-specific tools separately from system modeling tools typically leads to redundancy, inconsistency, and less efficient engineering processes.

Graphical interfaces presented by physical interaction and signal flow simulators express concepts similar to the Systems Modeling Language (SysML), an extension of the Unified Modeling Language (UML). Both languages show system components, how components are connected together, and how physical substances and information flow between components. SysML and these simulators both have underlying textual languages to record models in computer-processable file formats. Simulators translate models specified through graphical interfaces into file-based formats, which are then transformed into equations for solution by numerical analysis. SysML-based tools use their file-based formats to perform other kinds of analysis and verification, checking completeness of designs against requirements.

When SysML tools and physical interaction and signal flow simulators are used separately, simulation engineers must re-specify their systems in each tool they are using, including information that is also available in SysML models.

## OMG SysPhS standard implementation

A new [OMG SysPhS specification](#) (SysML Extension for Physical Interaction and Signal Flow Simulation) defines SysML elements mapping into Modelica and Simulink (incl. Stateflow, Simscape) models.

It is implemented as one-way transformation of selected SysML blocks and supports both black-box or/and full implementation which includes parametrics, state machines, internal structures with ports, interfaces and connectors.

Pure non-annotated SysML models can be exported, using SysPhS profile or libraries is not required for basic cases as blackbox structures.

Exported models and diagrams are ready to be opened in Simulink or Modelica tools for further implementation refinements, debugging, simulation and code generation.

## Related pages

- [Simulink export](#)
- [Modelica export](#)
- [Sample models](#)