

# Where MBSE and PLM Fit into the Digital Thread

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## Introduction

As Model-Based Engineering evolves into Model-Driven Engineering, there is an increasing demand for a centralized and integrated model hub, or Integrated Model Environment (IME), to manage and leverage the diversity of models and simulations used to engineer today's complex systems. The synchronization of all project models and simulations that forms a Total System Model (TSM) is created by weaving a Digital Thread through every system artifact that supports engineering processes and decision-making across the system to shorten the design phase, reduce costs, and optimize performance.

## Objective

The objective of this research is to evaluate if Model-Based Systems Engineering (MBSE) and Product Lifecycle Management (PLM) tools can be jointly utilized in an IME to meet the challenges of interfacing and synchronizing cross-domain modeling tools to create a TSM, as well as identify what limitations exist.

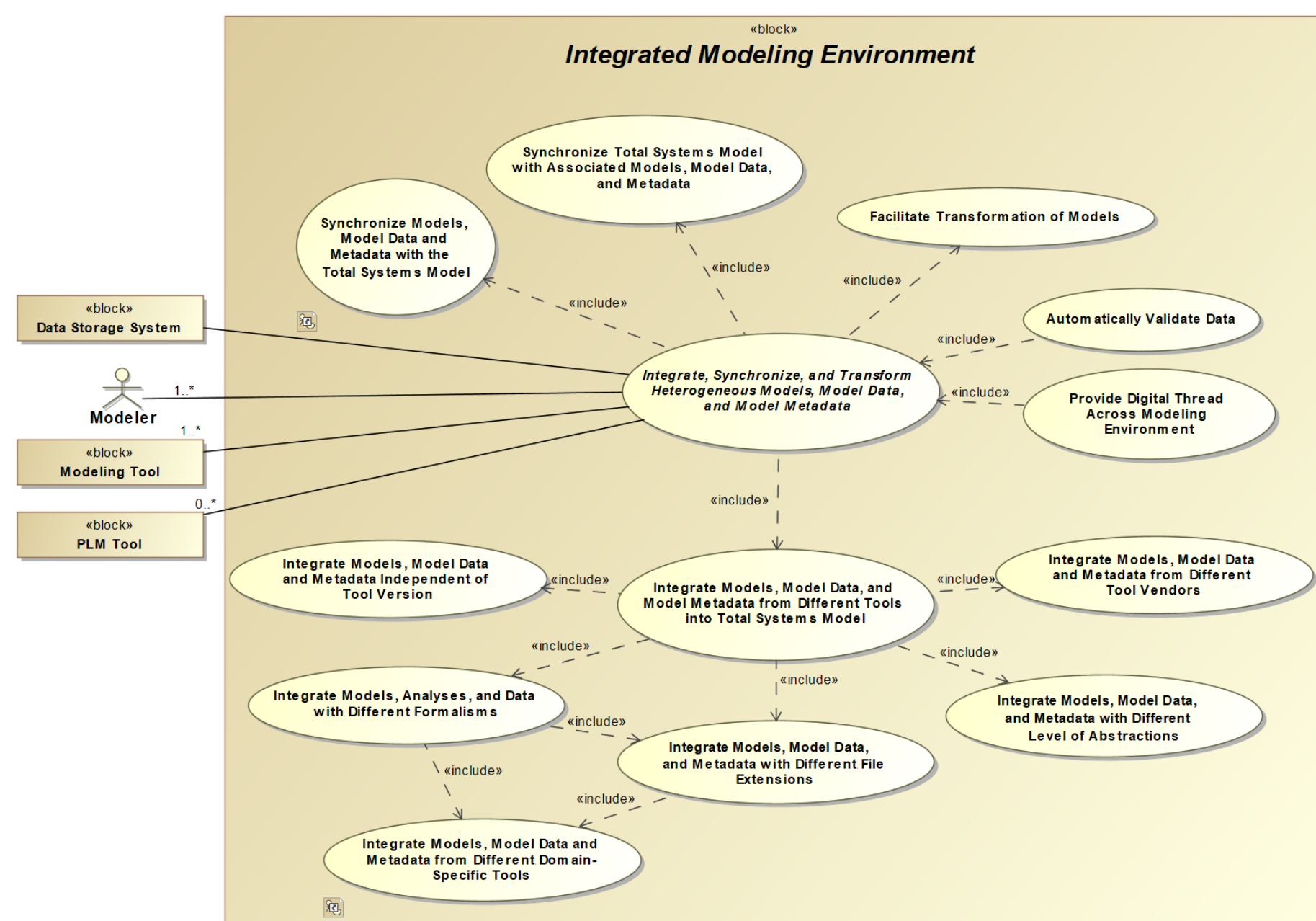


Figure 1: Use Case Diagram

## Methodology

A systems engineering approach is used, utilizing a Systems Modeling Language (SysML) tool to model the desired capabilities (Figure 1), requirements (Figure 2), structure, interfaces (Figure 3), and behaviors of IME configurations. IMEs are then objectively graded by the number of capabilities met.

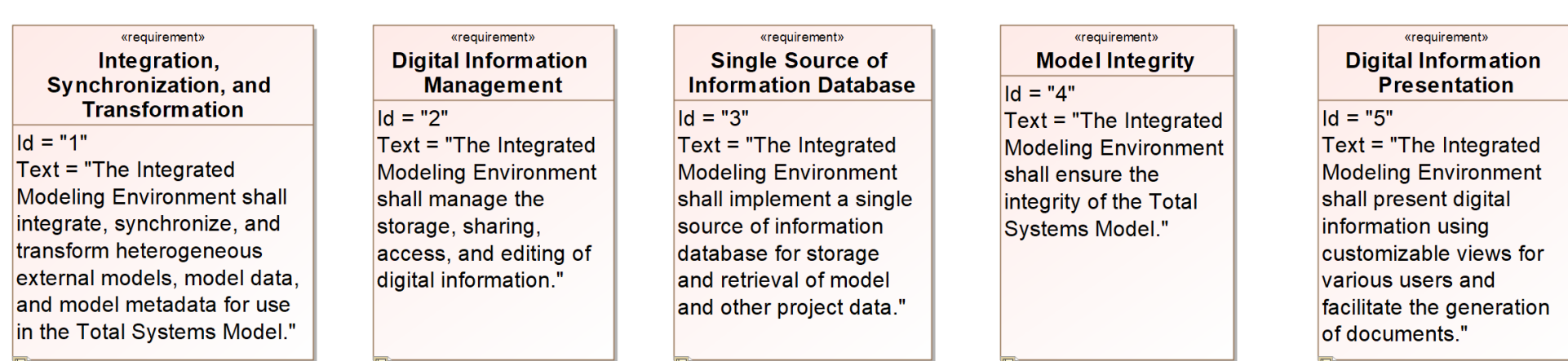


Figure 2: Requirements Diagram

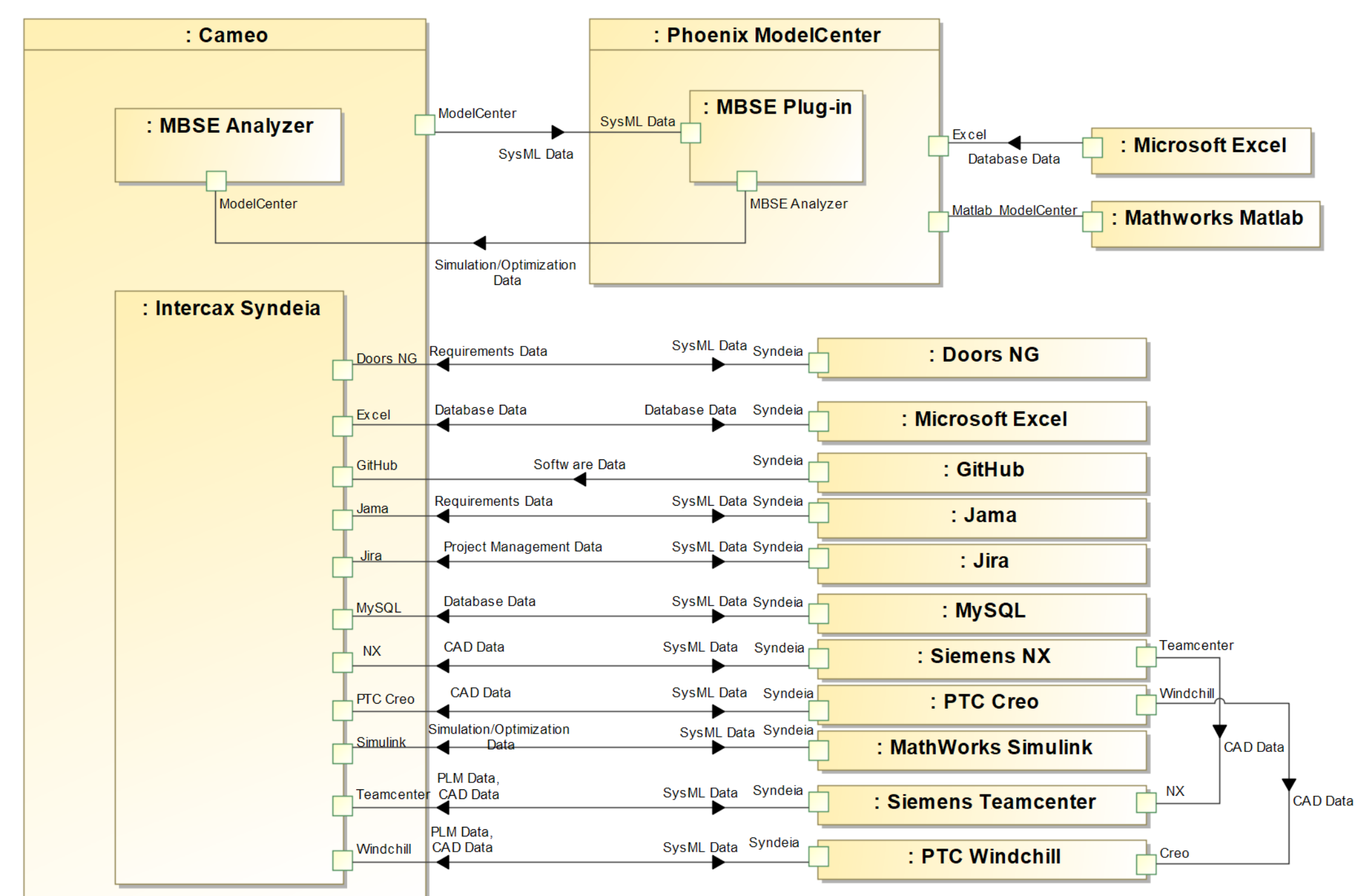


Figure 3: Internal Block Diagram

## Results

**Benefits:** ability to perform MDAO using the SysML tool as the controller and relevant data from external models, constant validation of external model parameters to TSM requirements, utilization of proven data management practices of PLM, facilitation of Model-Based Enterprise  
**Limitations:** not a robust solution since configurations are tool-dependent, reasoning on model for completeness and accuracy has not been proven to be accomplishable, cost of more software, requires employee training

## Conclusions

By creating an IME that uses a SysML tool with tool plugins and a PLM tool, more capabilities can be met than by either standalone tool.

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