The objective of this project is to enable the construction of manufacturing system simulation models using model based engineering principles. This capability will result in:
- Better and more reliable sharing of system specifications between stakeholders.
- Faster, better, cheaper integration and use of analysis tools.

The essence of our approach involves the following steps:
1. Using SysML, we create a “domain specific language”, or DSL, for modeling the electronics systems assembly processes used by Rockwell Collins (RC). This DSL provides the syntax and semantics for describing a bill of materials (BOM), resources used in the manufacturing process, and the process plan for each part in the BOM.
2. Using a model transformation language (ATL in the ECLIPSE domain), we develop a script that will parse an instance model developed using the DSL, and create an Microsoft Access™ database containing the corresponding Arena simulation model.
3. The model is read by Arena from the Access database, and executed.

SysML has been developed in the context of OMG’s “layered meta-modeling architecture, called the Meta-Object Facility (MOF). The three layers of models/abstractions in this application are:
- M1 - user models.
- M2 - meta-models, and
- M3 - meta-meta-models.

where M1 is the least abstract and M3 is the most.

Potential benefits are attained in:
- Order of magnitude reduction in the time, cost and effort required to develop manufacturing system simulations.
- Formal specification of manufacturing systems in SysML that supports early feedback to product and manufacturing systems designs.

Other opportunities:
- This approach can be extended to other domains, such as supply chains, humanitarian logistics systems, and health care systems, by defining appropriate DSL and transformation languages.
- This approach can be extended to other analysis tools as well, such as optimization, queuing networks, financial models, etc.