The Supervisory Control Theory (SCT) is one of the most important modeling theories for supervisor synthesis and verification for discrete event system (DES). The advantages are:

- Rigorous mathematic modeling
- Numbers of existing theoretical methods and algorithms
- Tool supports: TCT, Desuma, Supremica...

However, there are still gaps between theoretical developments and applications of SCT in engineering practice. Why?

Due to the scope of SCT, there isn’t:

- Links between informal requirements and formal specifications
- Structure models
- Implementation models
- A global framework to standardize the modeling process from informal specification to control realization

MBSE

In engineering practice, Model-Based System Engineering (MBSE) is a powerful methodology for system design. V-model is a typical modeling process in MBSE.

SysML is a graphic modeling language for systems engineering. SysML includes nine diagrams so as to provide a standardized and unified modeling language by which system design can be visualized and modeled from different perspectives. Therefore, SysML can be regarded as a partial solution to make up with the limitations of SCT.

The proposed framework:

- Integrates SysML language and SCT paradigm
- Defines a global process, from initial needs to final program
- Includes 13 viewpoints on the system, from requirements and system to control to controller
- Ensures traceability of the modeling choices by links between models
- Improves the reusability of models with a template-based approach
- Is supported by modeling tools (Rhapsody and Supremica) and XMI standard

PERSPECTIVES

- Extend the template-based approach in order to realize an efficient and accurate way of formalization. For example, build an implementation of model libraries for specific domains
- Apply the framework on more case studies, to prove the feasibility of the proposed framework
- Study her semantic of behavior diagrams in SysML and their semantic links with Automata
- Build a tool to support the framework