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## Model-based development of modular complex systems for accomplishing system integration for industry 4.0

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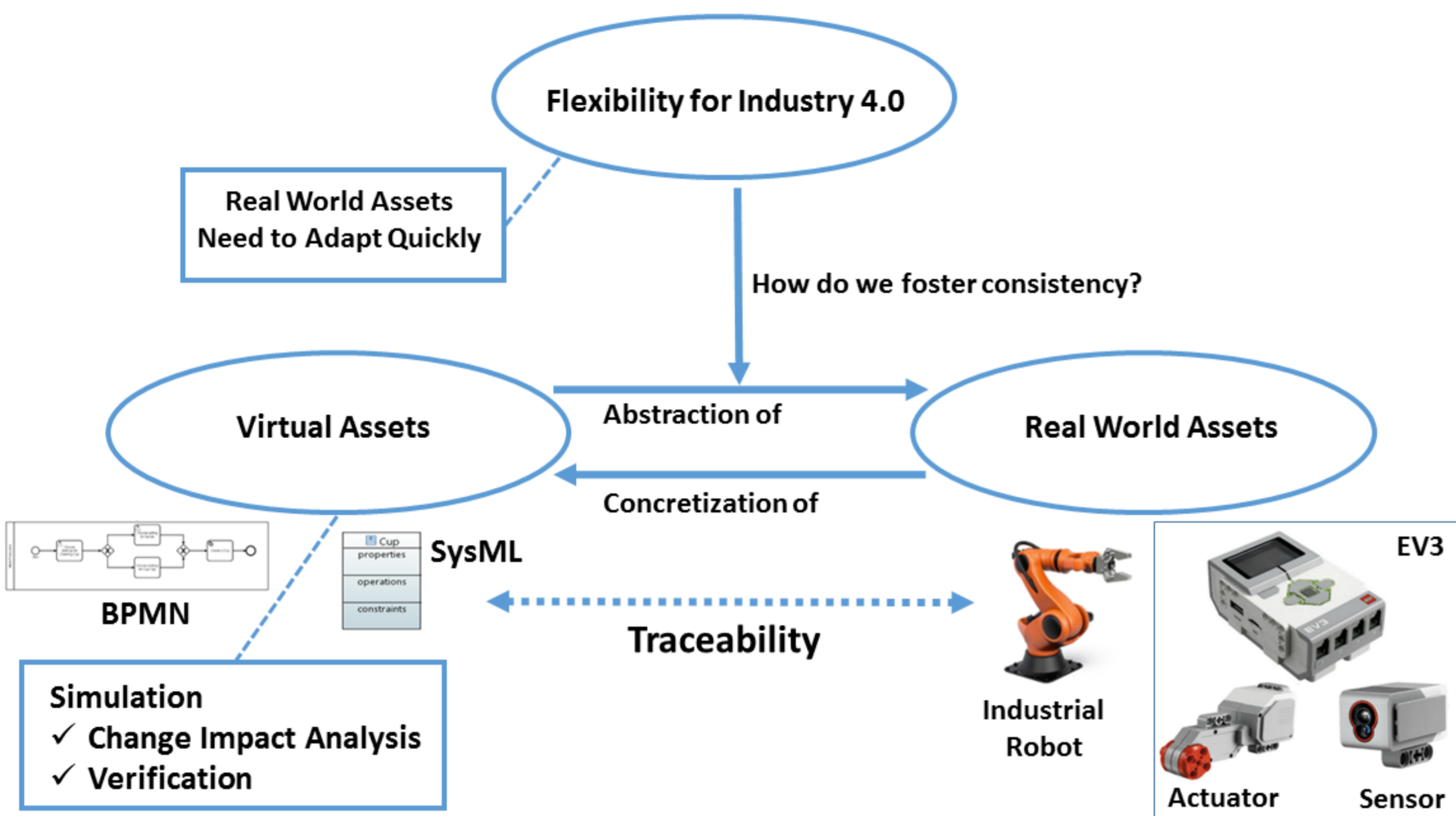
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# MODEL-BASED DEVELOPMENT OF MODULAR COMPLEX SYSTEMS FOR ACCOMPLISHING SYSTEM INTEGRATION FOR INDUSTRY 4.0



## Research Context

**Flexibility** - Enable factories of the future to be **reconfigured** in a **short duration of time** for e.g., weeks instead of months (To create customized products)

## Research Objectives

- Interoperability
  - Achieve system integration based on industrial standards
- Traceability
  - Easy **change** impact analysis
  - Consistency between virtual assets (model **simulation**) & real world assets (model **execution**)

## Approach

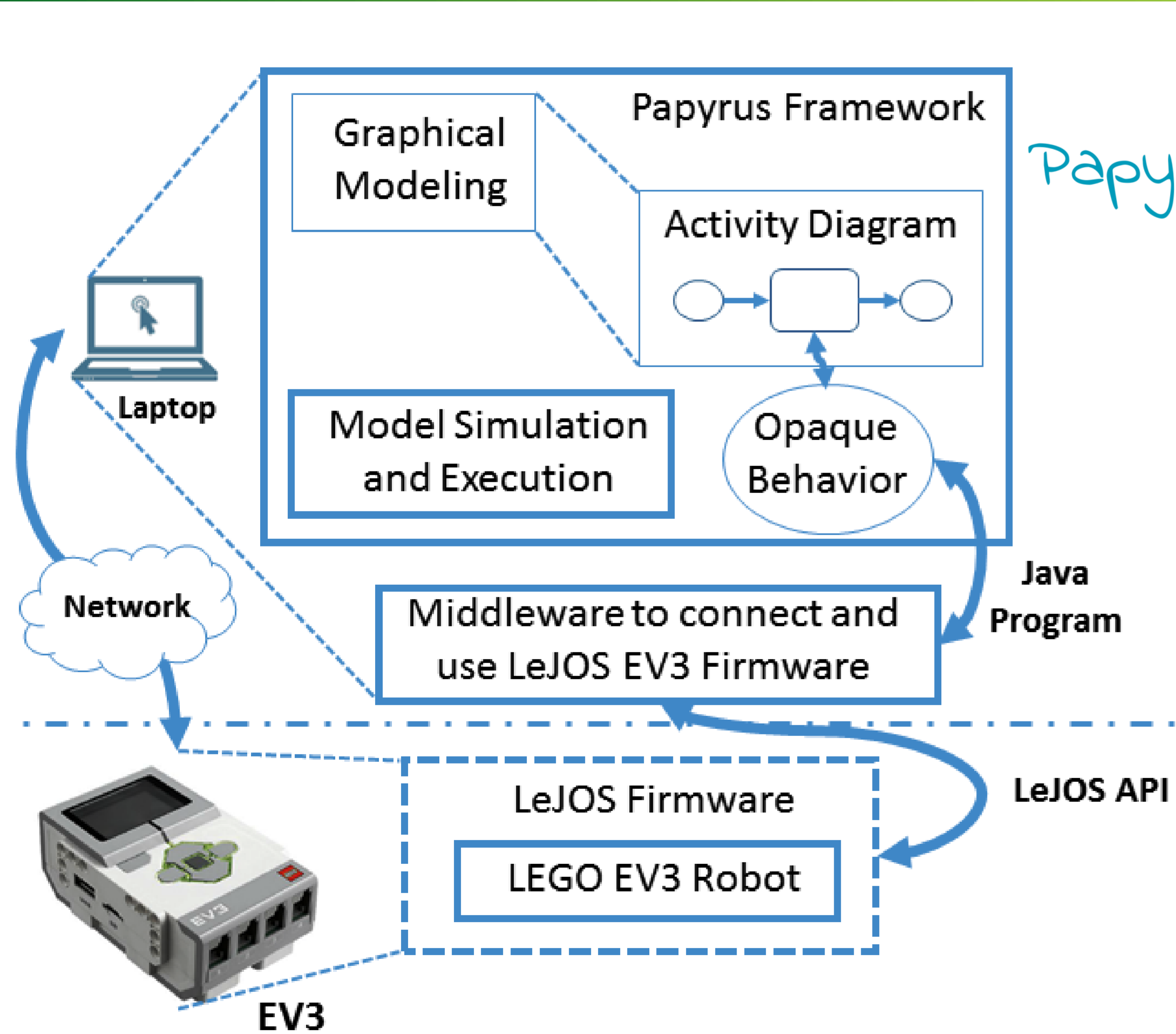
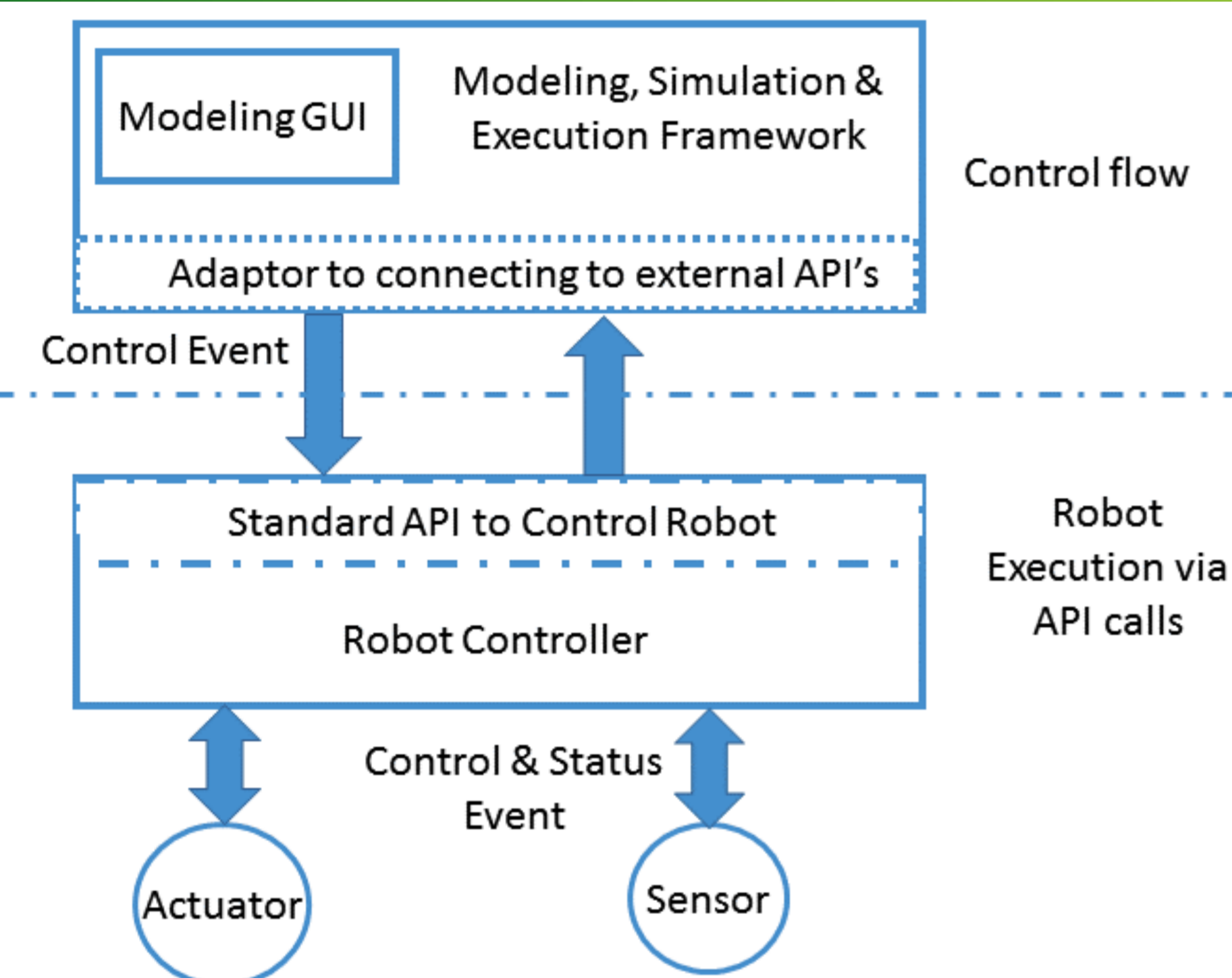
- Separation between the model-based **behavior** layer and system firmware
- Simulation of the system using **standardized** models (verification)
- Execution of the system (robot) using **API calls** via executing already verified models

## Validation

- Validated the approach for **LEGO EV3** robot using Papyrus framework
- **Simulated UML Activity** models for moving EV3 robot using Papyrus **fUML** engine
  - Verified the models for correctness
- **Executed** the same **models** to **control** the **robot** in physical world (by connecting model execution engine to Robot API's )

## Future work

- Extend the model-based executing for industrial robots for e.g. **Kuka**
- Model simulation considering IoT aspects



## CONTACT INFORMATION

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