



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

Kunal Suri, Arnaud Cuccuru, Juan Cadavid, Sébastien Gérard, Walid Gaaloul, Samir Tata

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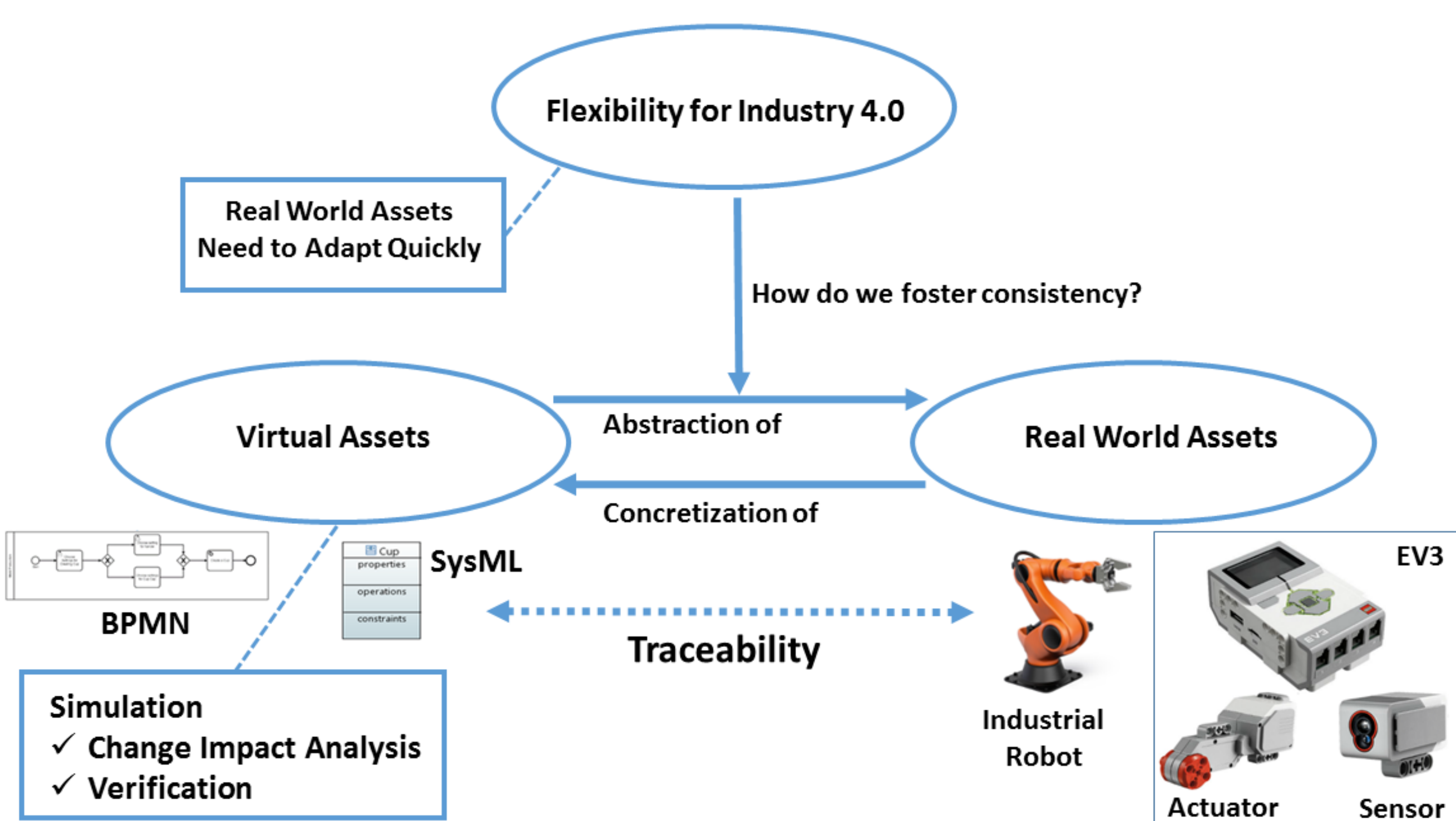
MODEL-BASED DEVELOPMENT OF MODULAR COMPLEX SYSTEMS FOR ACCOMPLISHING SYSTEM INTEGRATION FOR INDUSTRY 4.0

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)

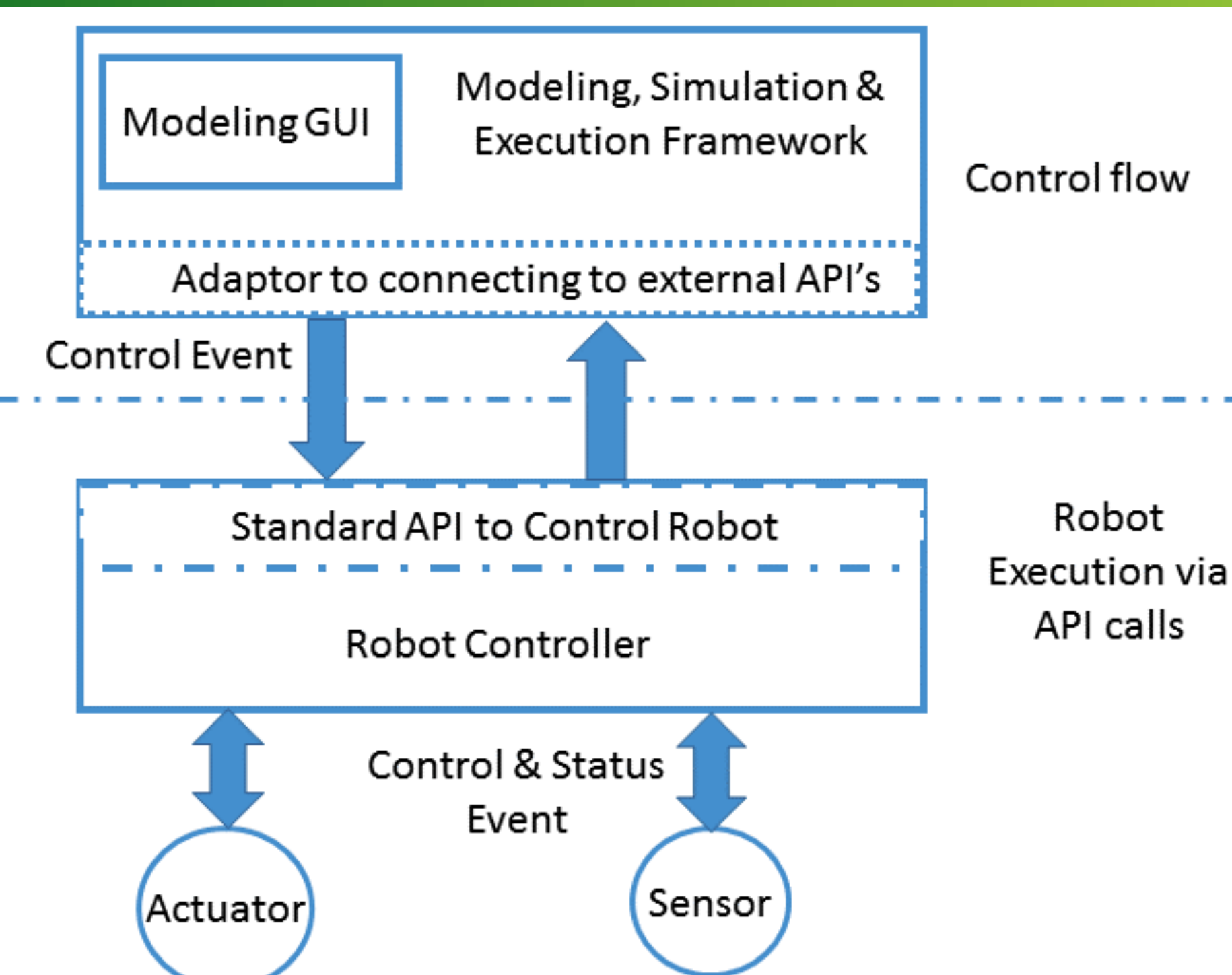
Research Objectives

- 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

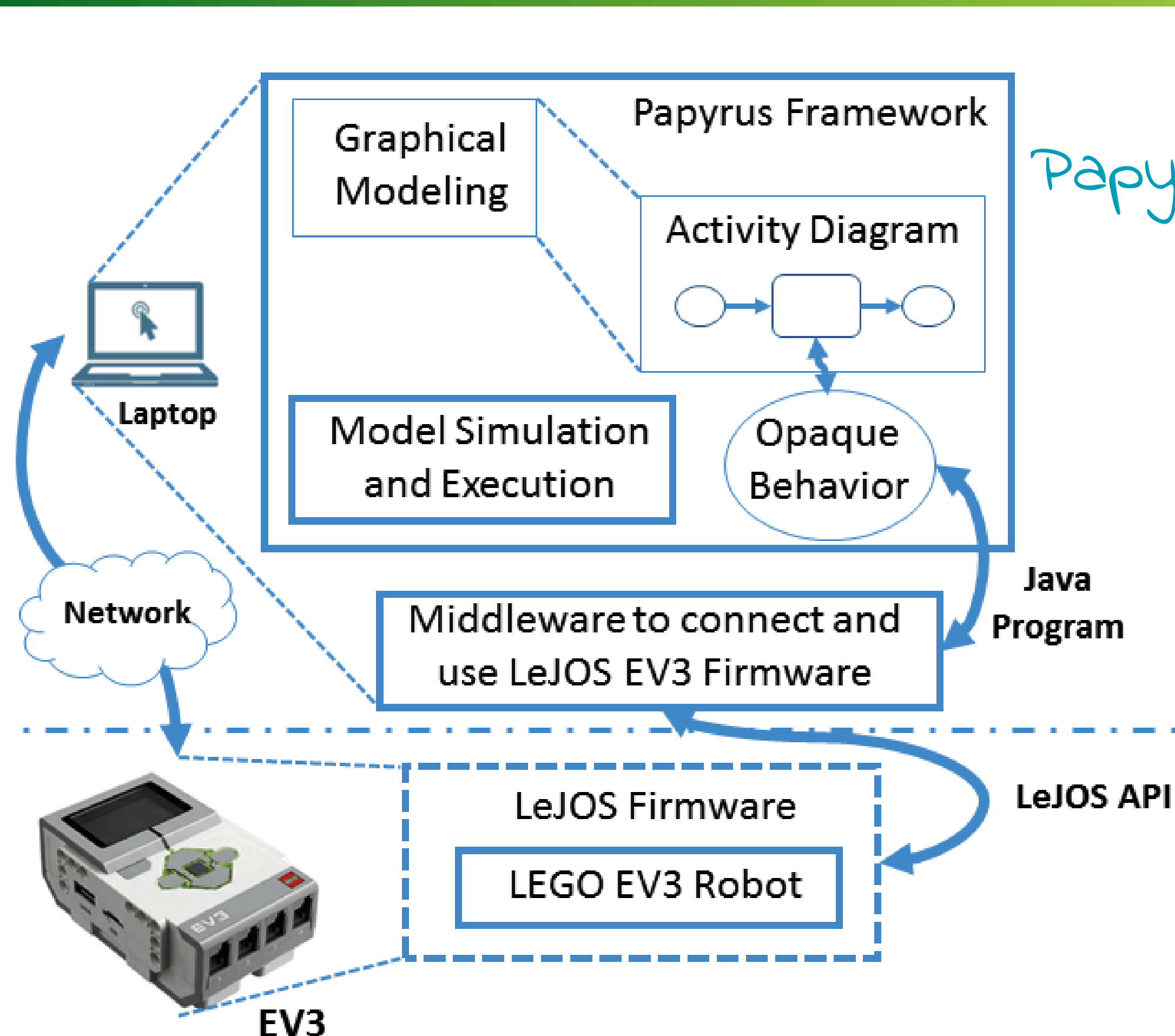


Validation

- 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

Kunal Suri kunal.suri@cea.fr
 Arnaud Cuccuru arnaud.cuccuru@cea.fr
 Juan Cadavid juan.cadavid@cea.fr
 Sebastien Gerard sebastien.gerard@cea.fr
 Walid Gaaloul walid.gaaloul@telecom-sudparis.eu
 Samir Tata samir.tata@telecom-sudparis.eu