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From Requirement to Execution

Implementing a PLCnext-Based Turbine Control System in Simulink

Jakoba Reimann

Key Takeaways

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1. Model-Based Design offers you many benefits
2. Matlab Simulink can help us to get one step closer to a world with 100% renewable energies
3. We show you the way from your first idea to the final product on hardware

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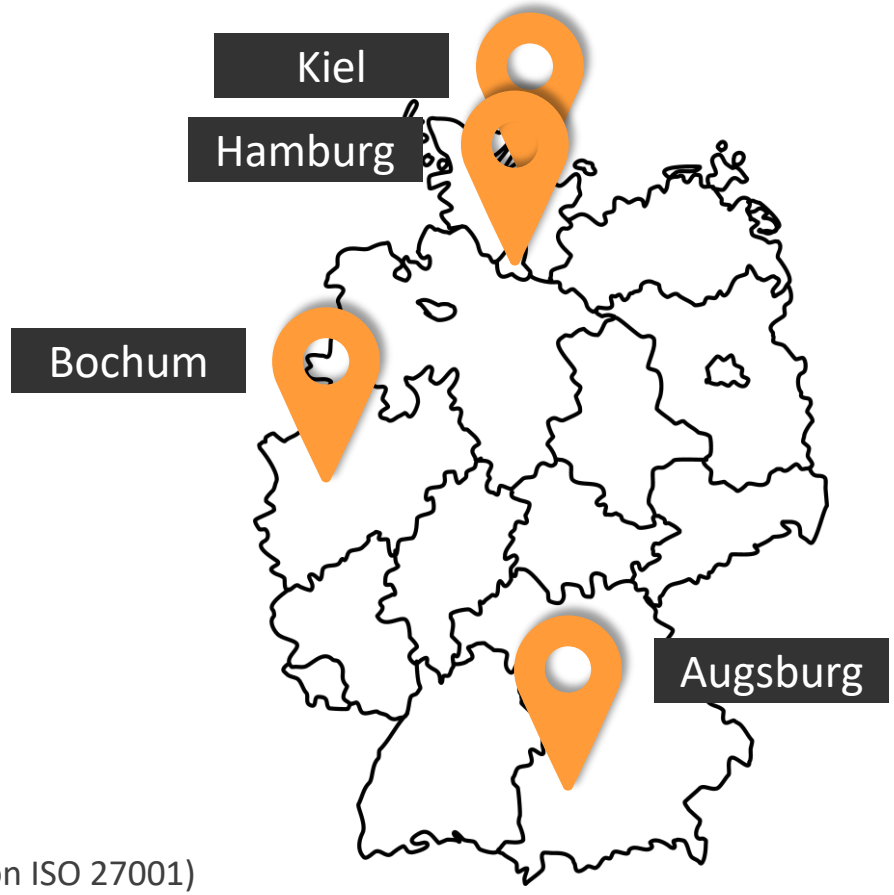

Quality management: DIN ISO 9001:2015
Information Security: TISAX Level 3 (Based on ISO 27001)

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Firmware Development

IoT & SCADA Systems

Model Based Design

- Control design & implementation
- Rapid prototyping
- Code generation & integration into real-time targets
- Test concept development & implementation

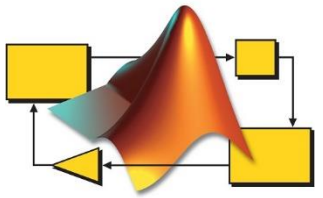
Industrial Communication

PLC Automation

Continuous Integration

HiL Testing

MathWorks



Partner

Content of this presentation

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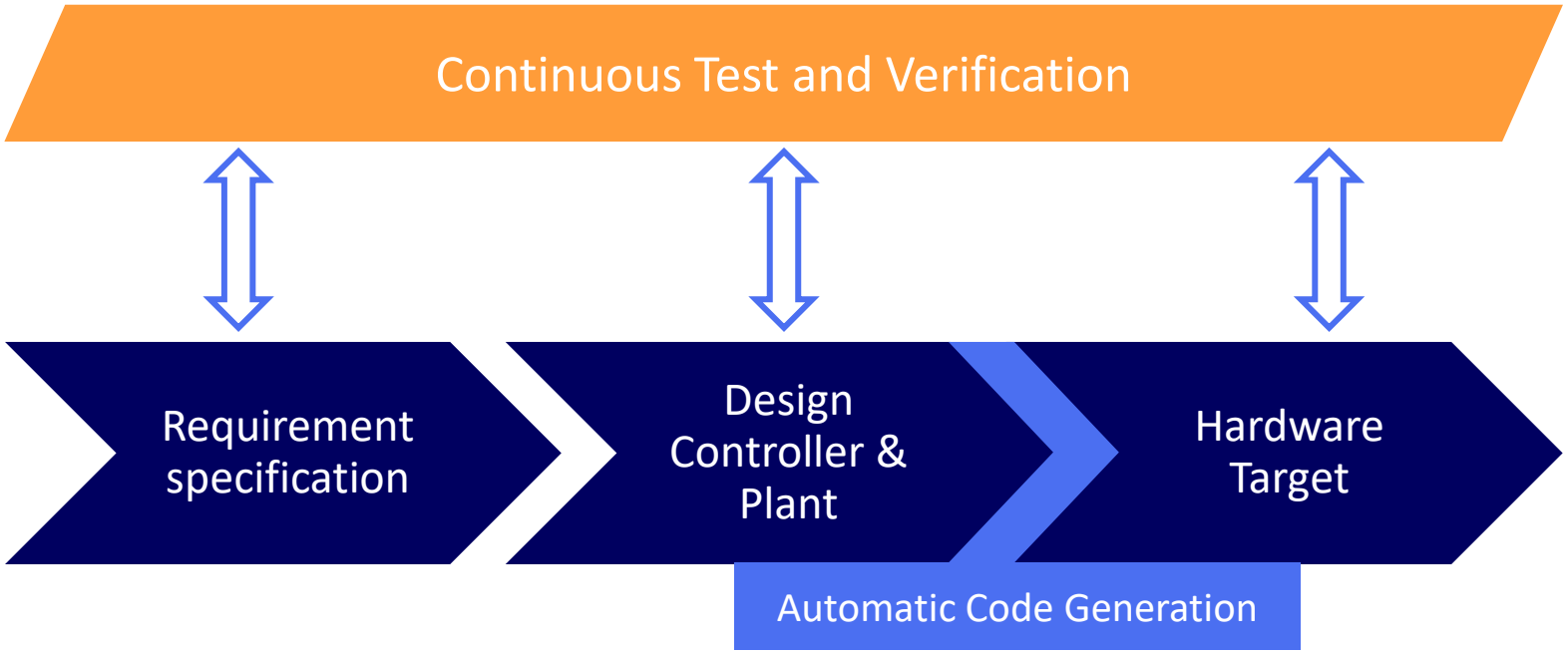
- What is model-based design (MBD) and why do we use it?
- The process of a requirement – from the idea to the prototype

Model-Based Design

What is model-based design (MBD) and why do we use it?



Model-Based Design

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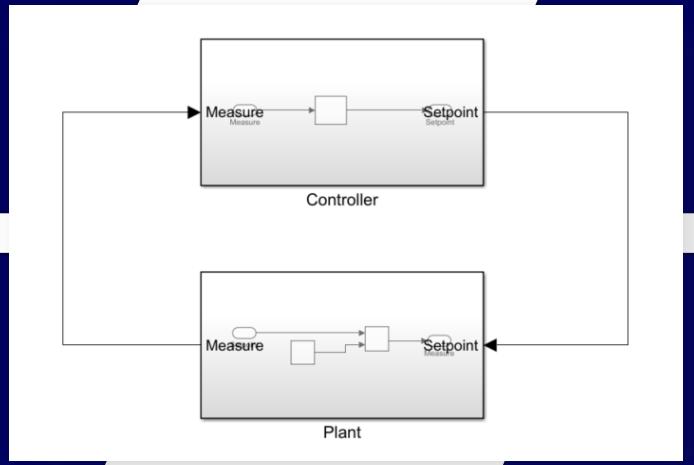
What is model-based design (MBD) and why do we use it?

Controller and plant design
- ✓ Create a model of the plant
- ✓ Verify controller directly in closed loop and configure controller model

Continuous verification
- ✓ Quick fault detection and fixing

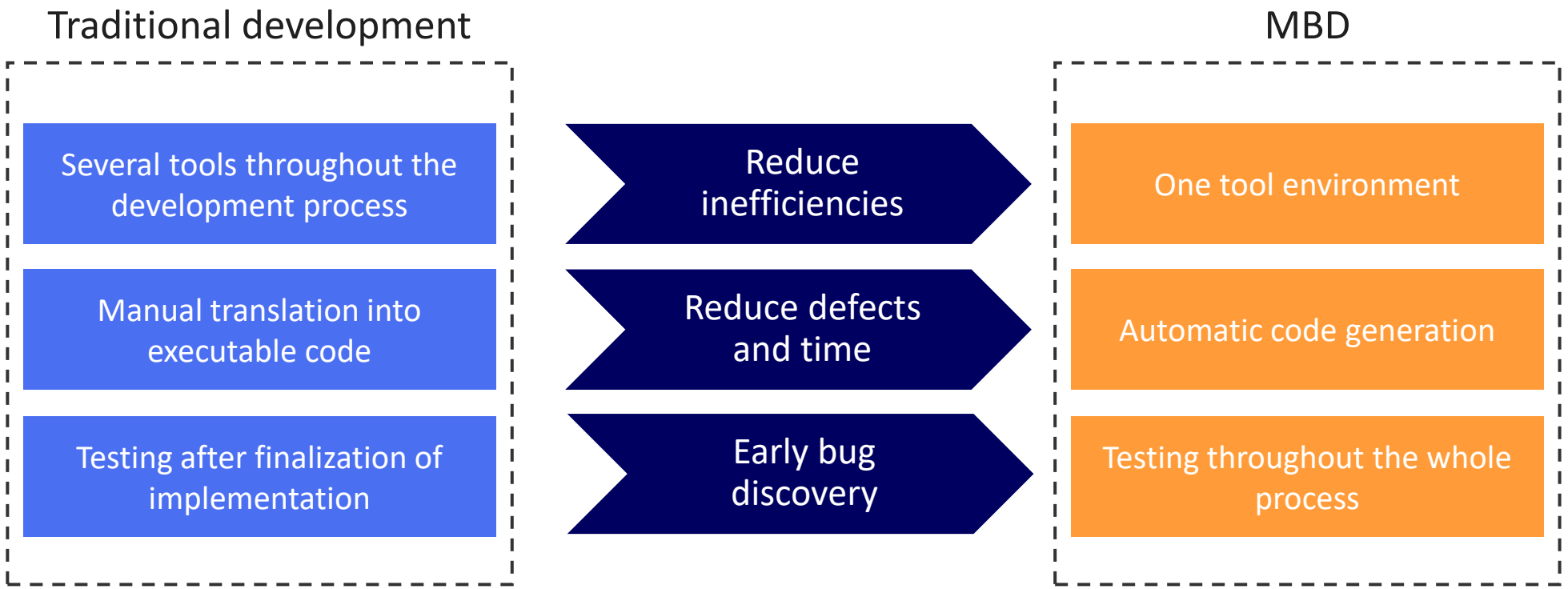


Automatic code generation
- ✓ No reimplementation in C, C++, ST or similar needed
- ✓ Hardware independent
- ✓ Applicable for different targets

Continuous integration
- ✓ Automatic test execution
- ✓ Static model & code analysis for design verification and Guideline alignment

Model-Based Design

What is model-based design (MBD) and why do we use it?



Introduction of the process

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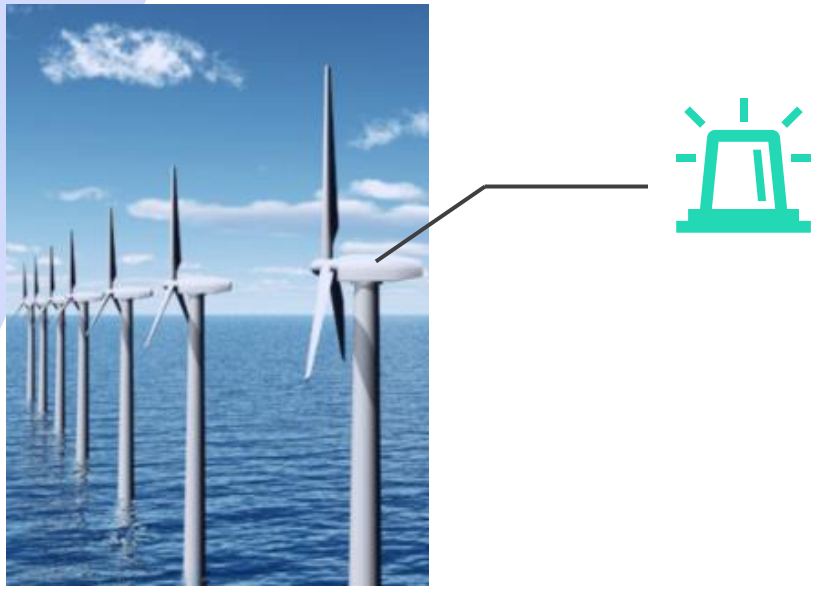
The process of a requirement – from the idea to the prototype

Example Requirement:

During the night, the turbine shall activate a green light on top of the nacelle.



Introduction of the process

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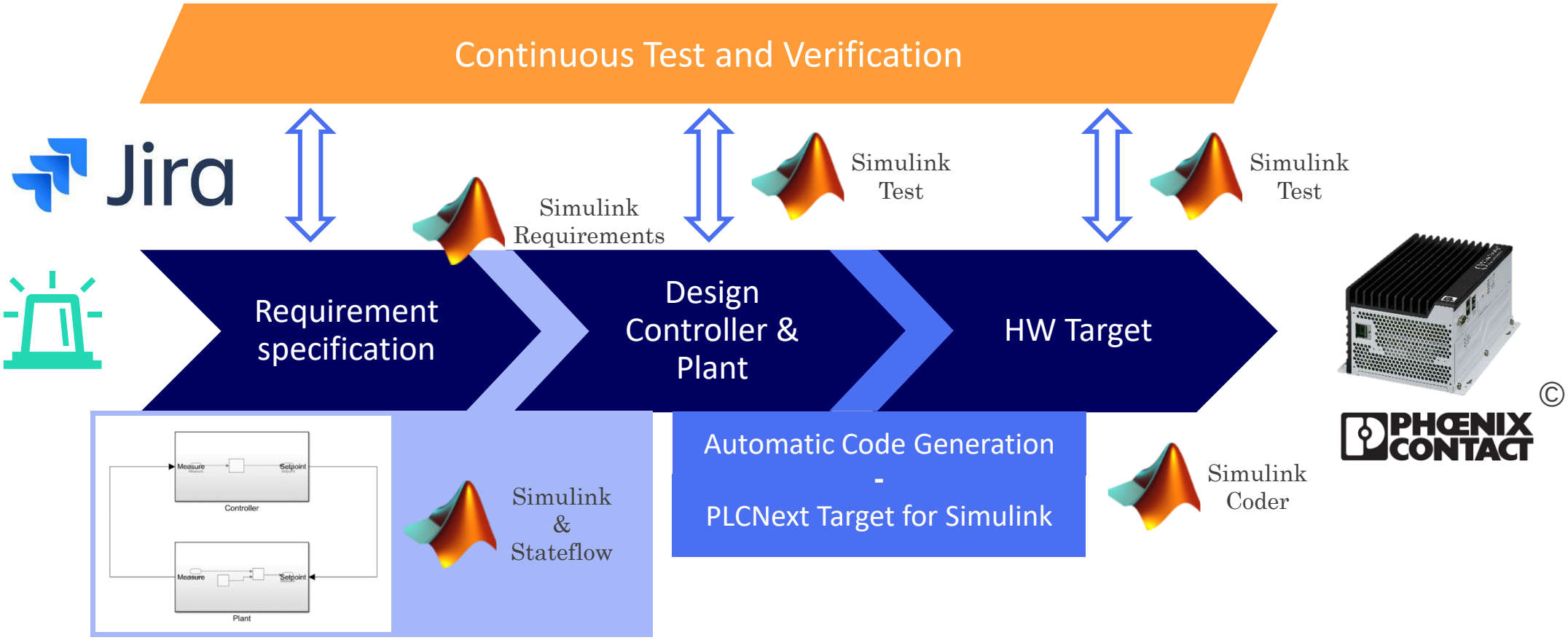
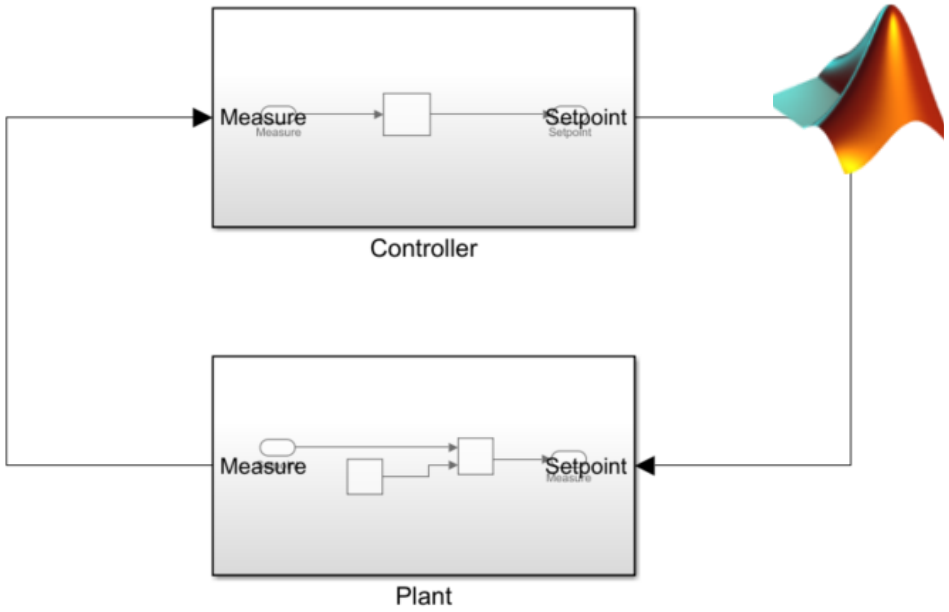


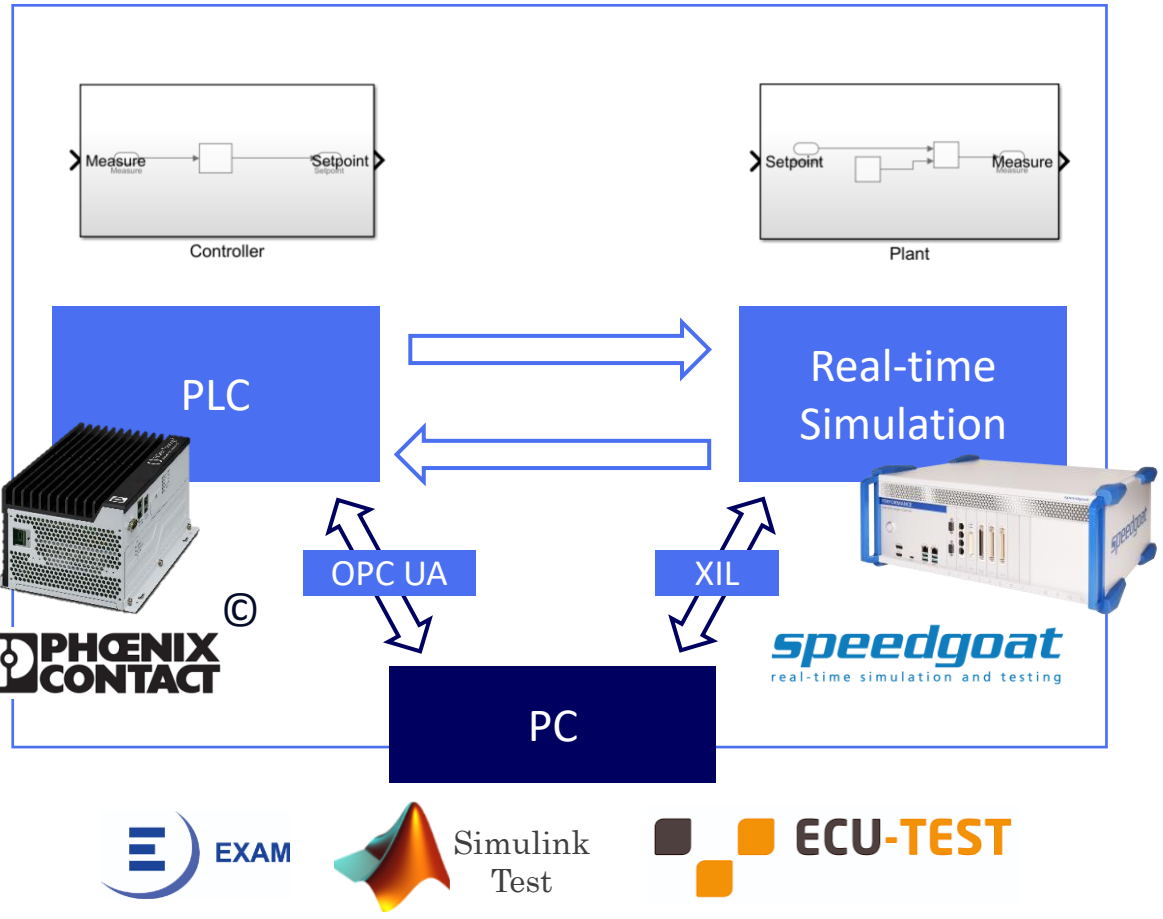
Model in the Loop testing (MiL)



Test closed loop behaviour with a representative model of the plant

- Purely simulative
- Testing of scenarios
- Integration of model parts to a whole system

Hardware in the Loop testing with PLCnext (HiL)



Test physical hardware with a representative model of the plant

- Real-time plant simulation
- Testing of communication and application interaction
- Time and cost efficient
- Model Viewer PLCnext Engineer

Hardware in the Loop testing with PLCnext (HiL)

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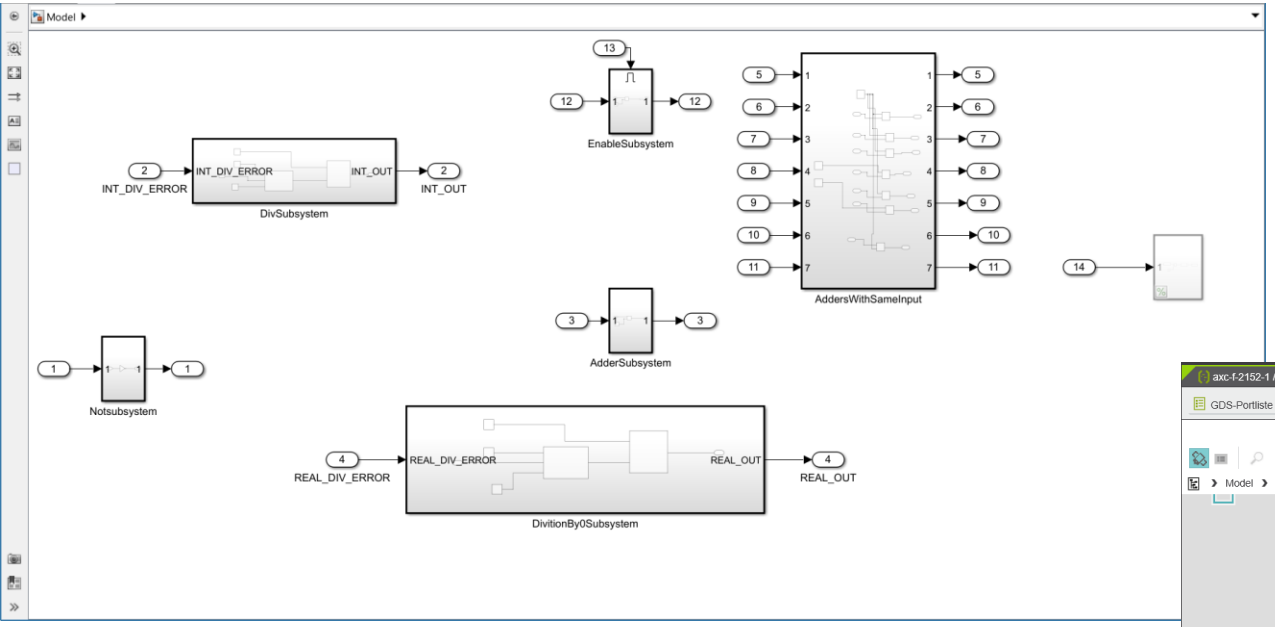

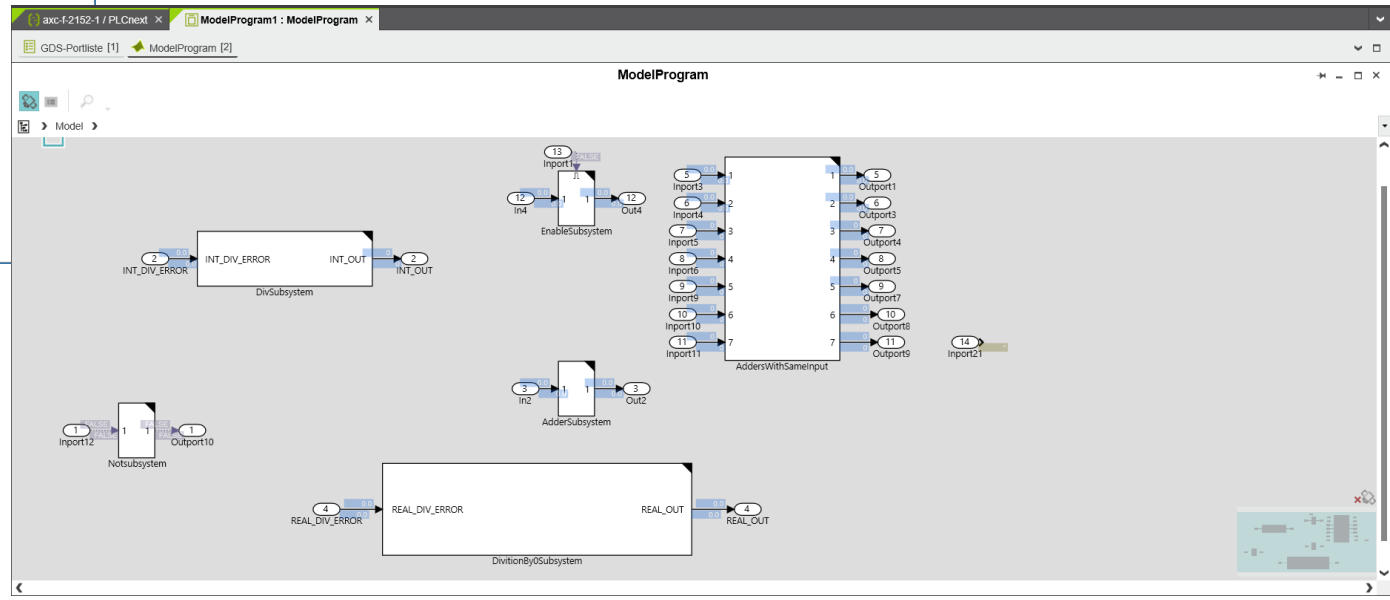

How we automate our daily work

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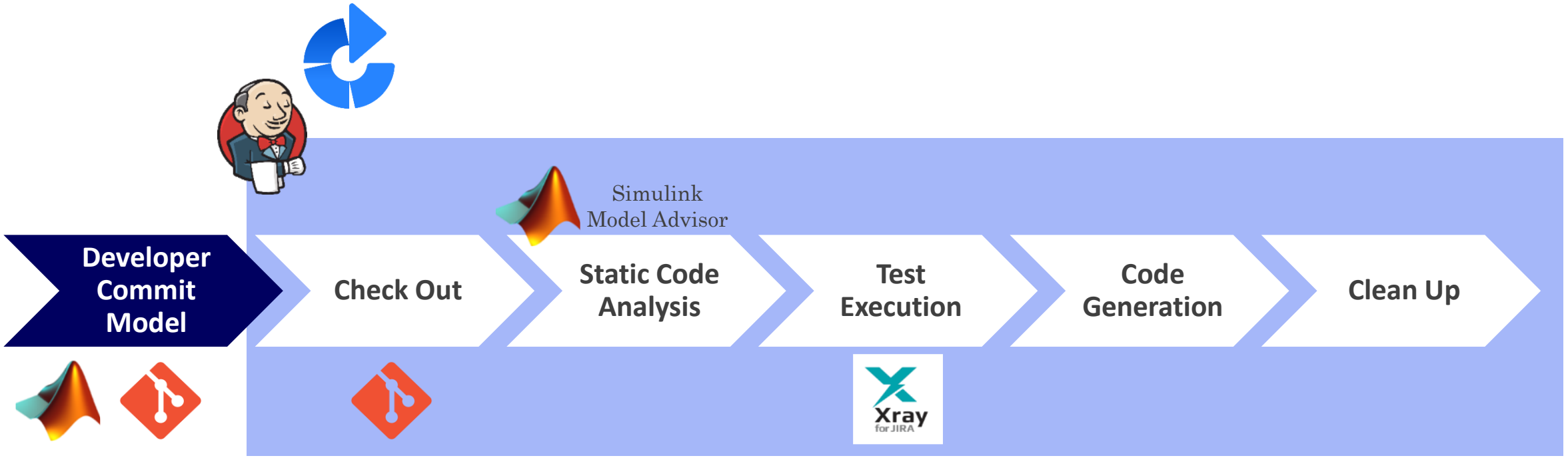

From theory to reality

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Realisation

ENERCON
ENERGY FOR THE WORLD

Turning visions into reality

Thank you for your attention!