

# Industrial Artificial Intelligence

Manufuture 2019  
Michael May | Siemens Corporate Technology |  
Helsinki | October 1st, 2019

**Additive  
Manufacturing**

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**Autonomous  
Robotics**

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**Blockchain  
Applications**

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**Connected  
(e)Mobility**

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**Connectivity  
and Edge  
Devices**

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**Cybersecurity**

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**Data Analytics,  
Artificial  
Intelligence**

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**Distributed  
Energy  
Systems**

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**Energy  
Storage**

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**Future of  
Automation**

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**Materials**

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**Power  
Electronics**

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**Simulation  
and Digital  
Twin**

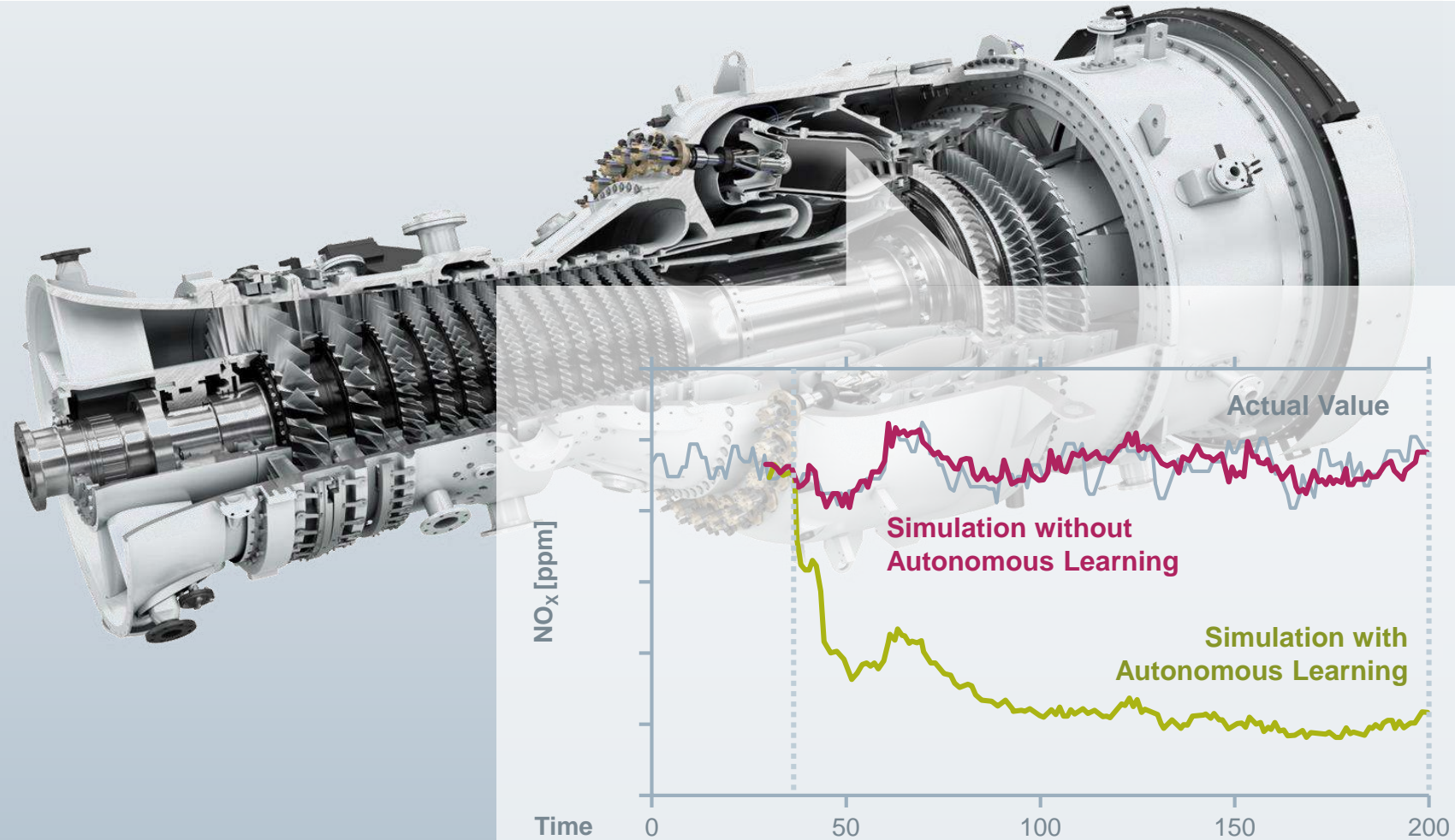
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**Software  
Systems and  
Processes**

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# AI for Performance Optimization – AI Autonomous Learning of Turbine Control

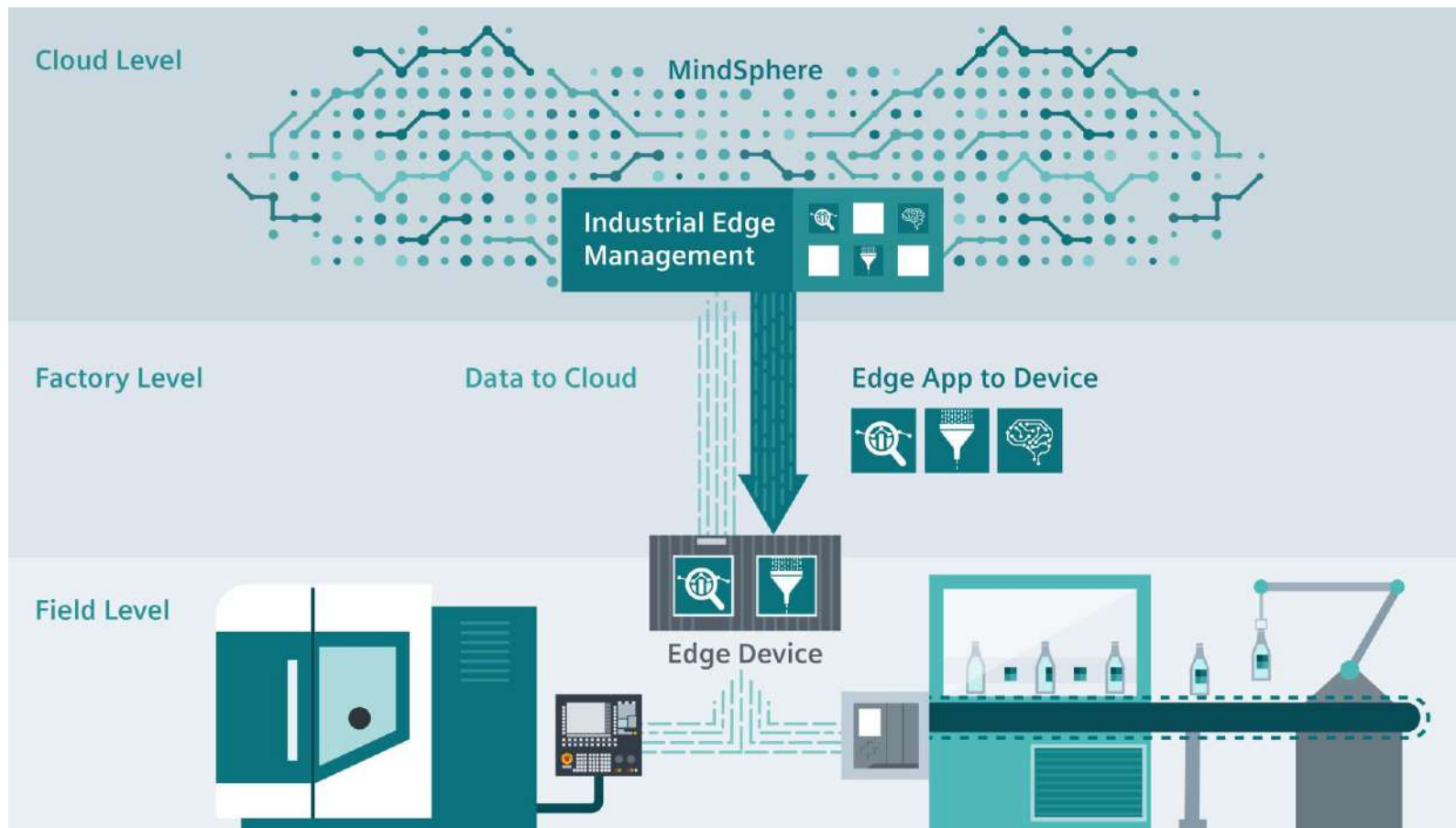
- AI learns from the behavior of a gas turbine in operation as well as fleet data
- Learns a control strategy that outperform manually tuned turbines
- Artificial Intelligence autonomously lowers the NO<sub>x</sub> emissions
- Deep Learning and Reinforcement Learning





# Factory Automation: Industrial Edge

Industrial Edge combines local and high-performance data processing directly within the automation system



# AI in Production Engineering – Fast and Efficient Engineering and Commissioning

## Optimizing machines throughput

- ML for tool relocation and changeover times
- Convex optimization methods to find exact optimal solutions
- Algorithm is implemented on edge device
- ▶ Productivity up by up to 20%





# Production execution – AI will enable autonomous machines

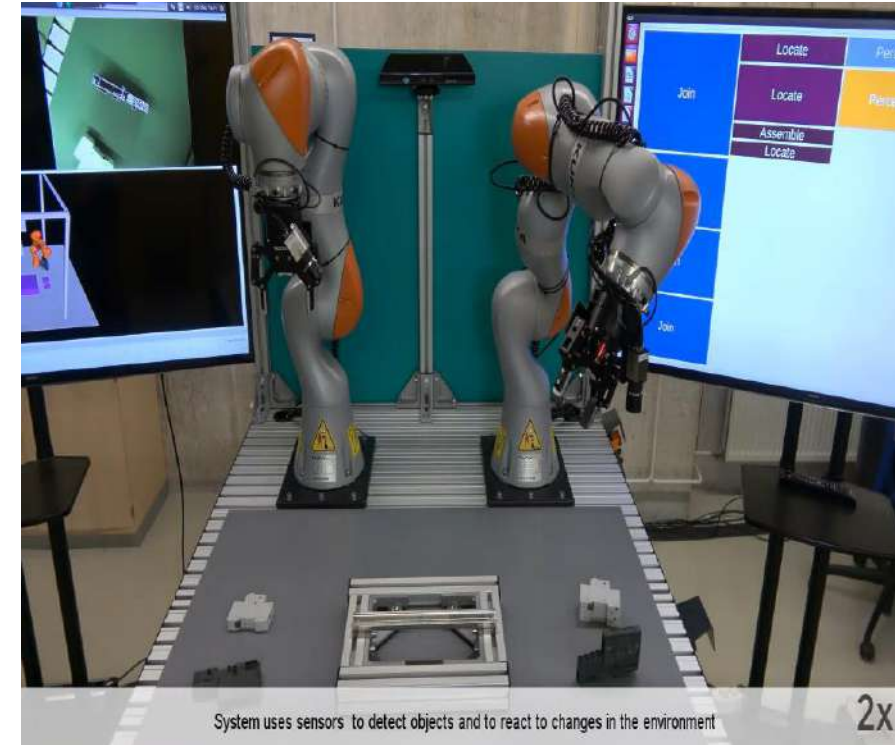
## Industrie 4.0 Vision

- Object recognition using deep learning
- Learning to pick objects
- Matching of skills to tasks by reasoning on knowledge graph
- Autonomous action and motion generation

### Self-adaptation (based on data)

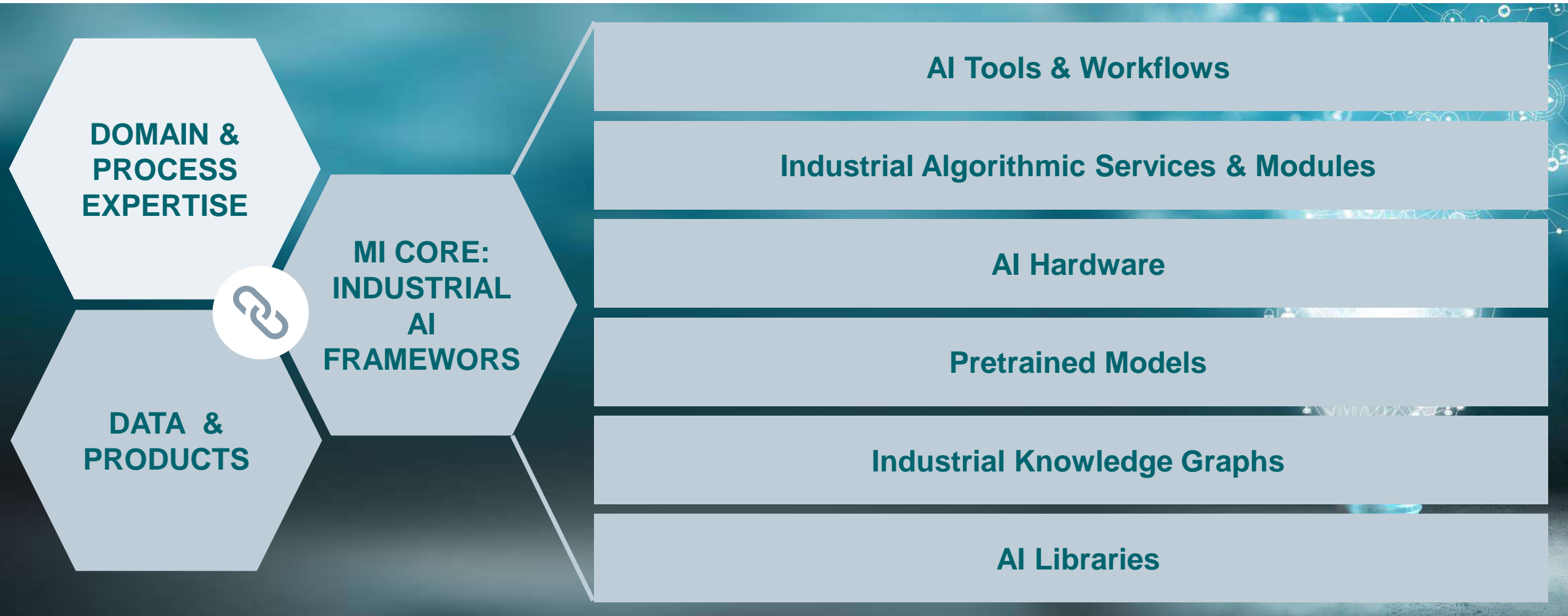


### Self-operation



**Vision:** Self-x without detailed programming or engineering  
... and without human supervision

# Next Level of Industrial AI – Frameworks for Rapid Industrial AI Adoption





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**Thank You!**

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