AI in Modular Production

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24.5.2023

smartFactory KL®

DFKI IFS Innovative Fabriksysteme

WSKL Werkzeugmaschinen und Steuerungen KAISERSLAUTERN

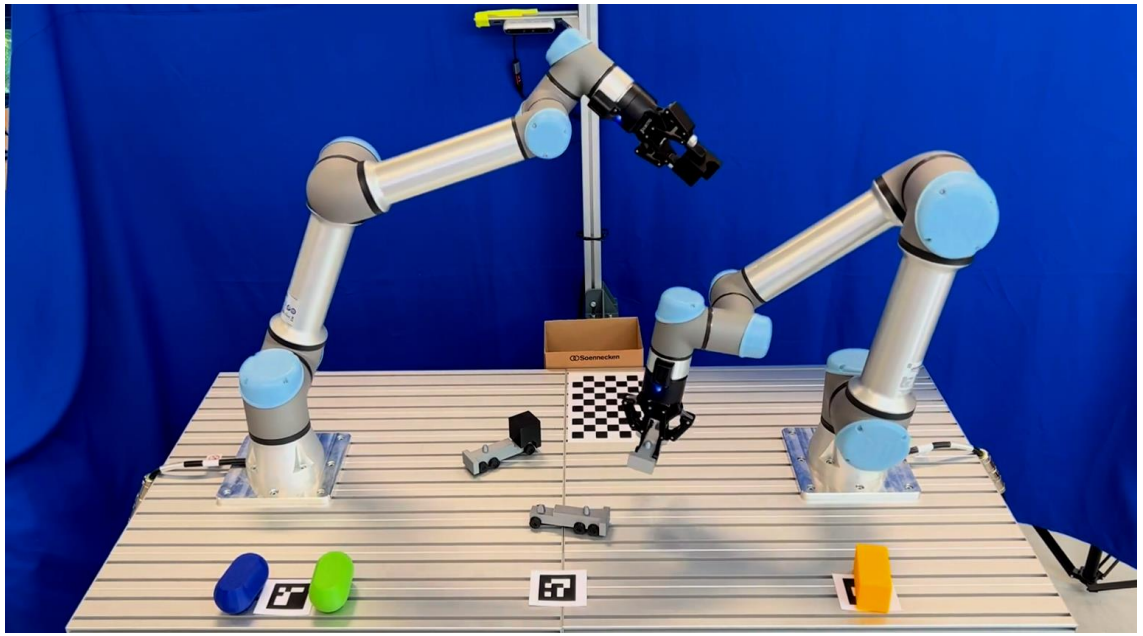
Who we are

Federated Learning

Collaborative Robotics

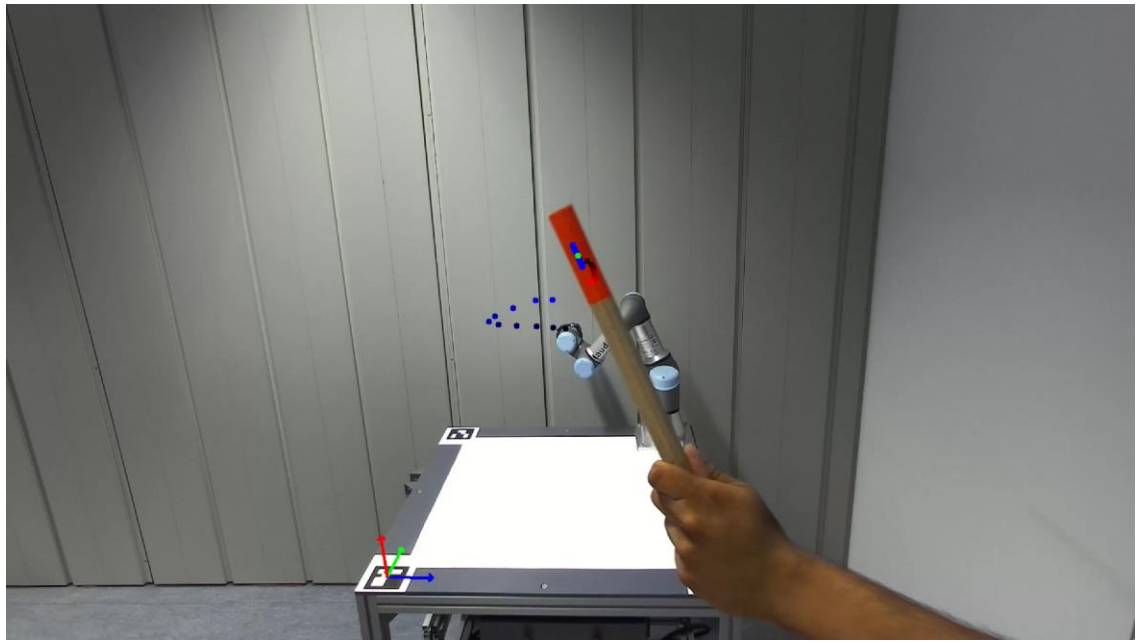
KoKoBot

ROBOT-ROBOT COLLABORATIVE DISASSEMBLY



Online trajectory planning with **collision avoidance**

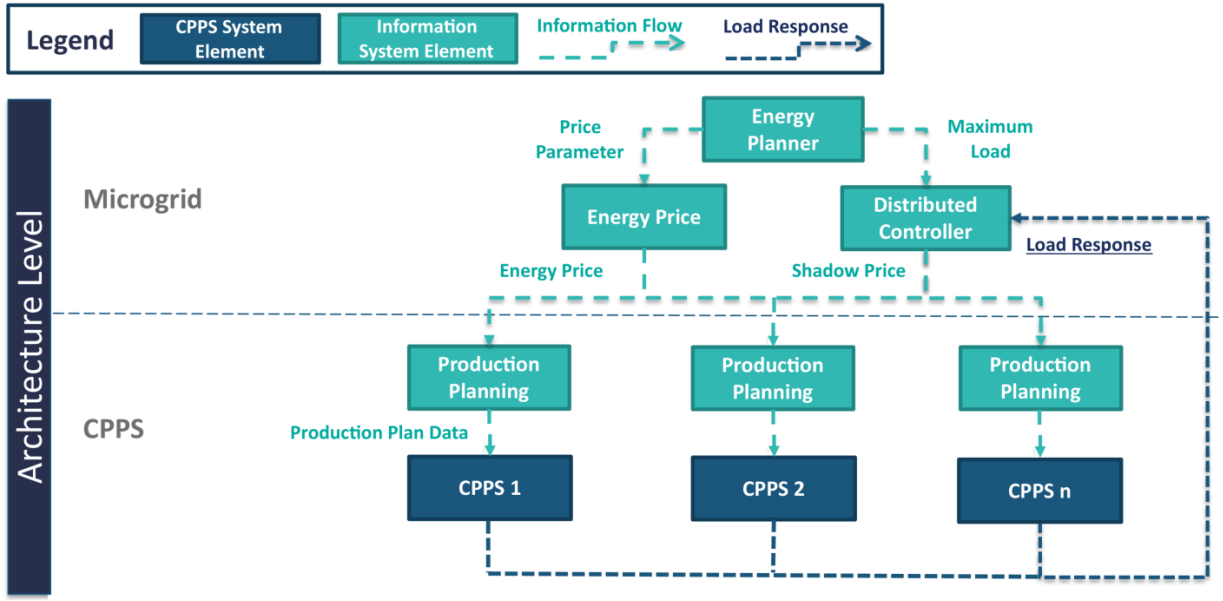
ROBOT-HUMAN HANDOVER

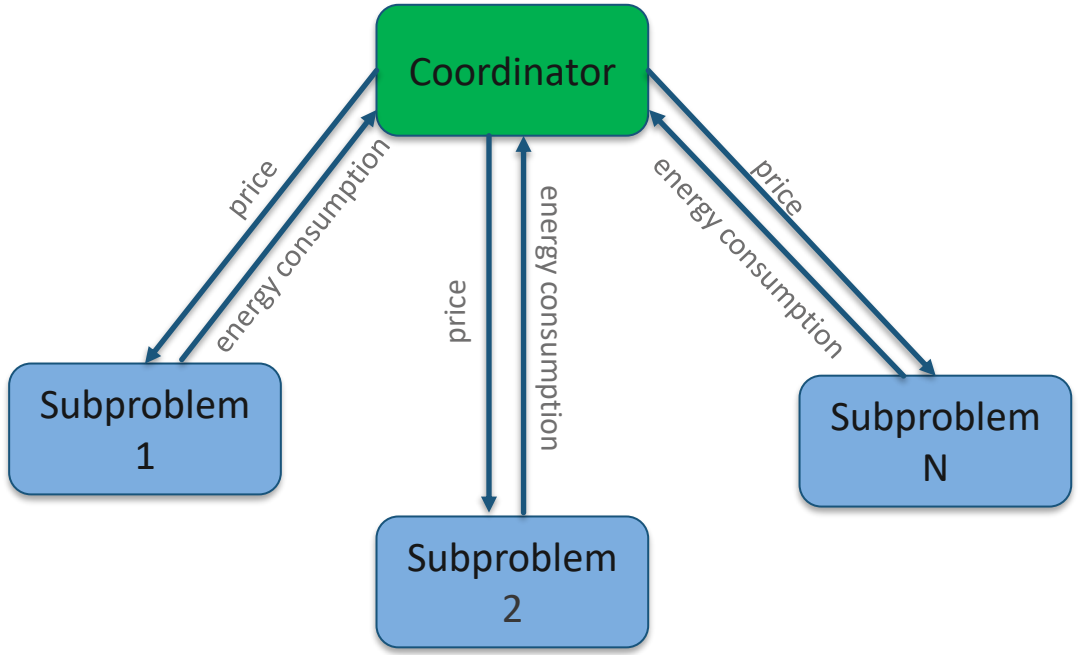


Online trajectory planning with **human motion prediction**

Distributed Mixed-integer Linear Programming

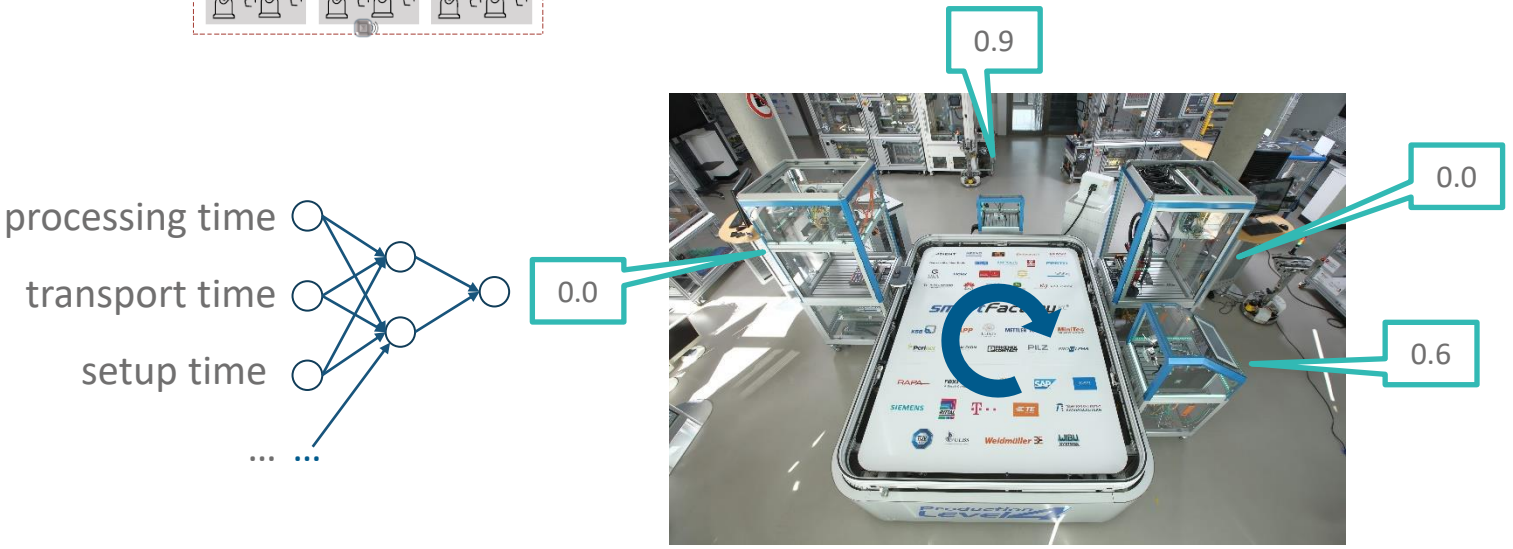
- Production sites consuming shared energy
- Each site plans ist own production and energy consumption
- Completion time and energy costs are minimized
- Total amount of available energy is limited
- Goal: Coordinate systems through „shadow prices“, without sharing sensitive information



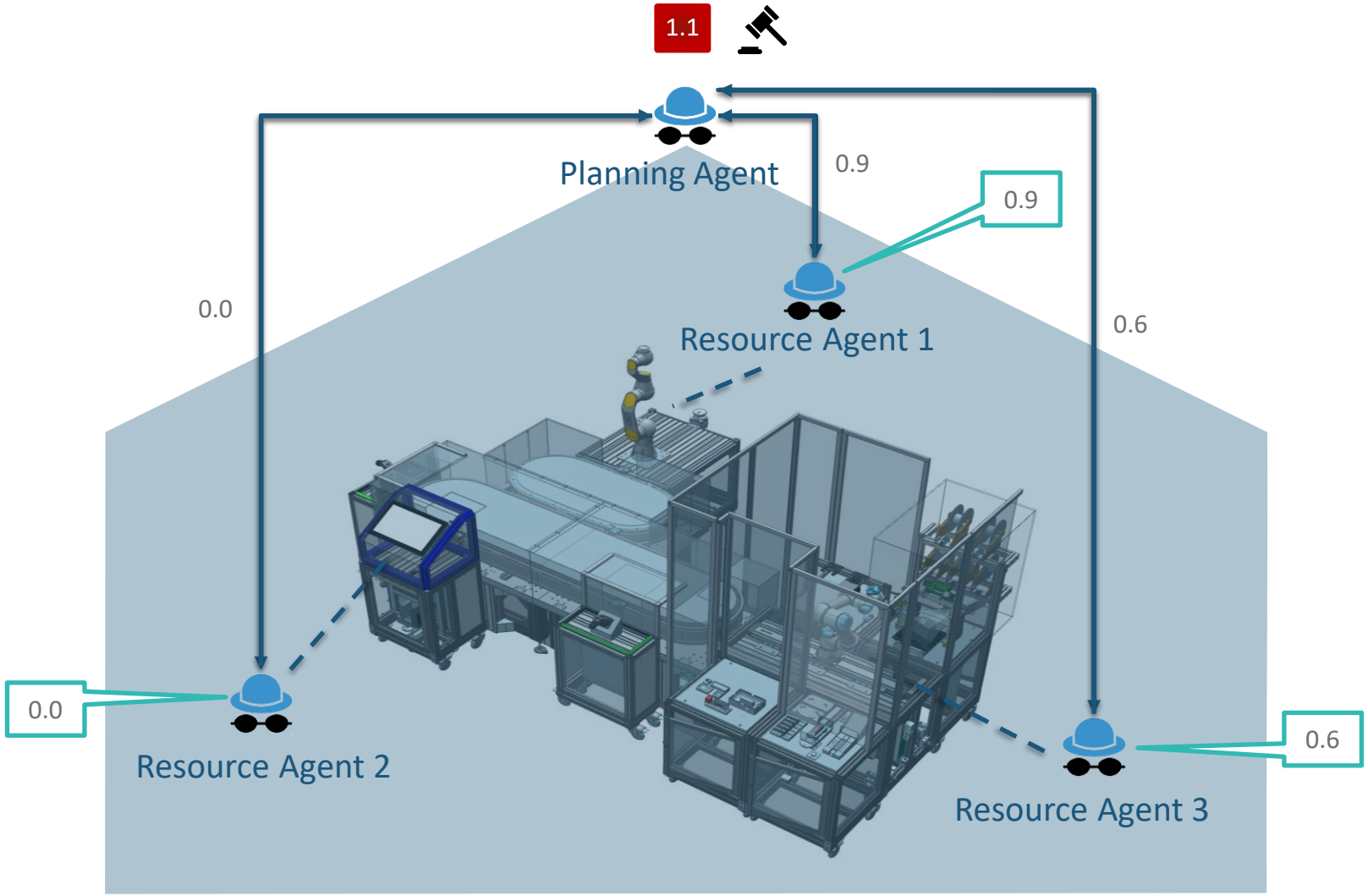


	Distributed		Central	
	C_i [h]	Cost_i [€]	C_i [h]	Cost_i [€]
System 1	12	5.87	10	6.65
System 2	12	5.45	12	4.59
System 3	12	6.63	12	7.49
Total	36	17.95	34	18.73
Objective		2.734		2.693

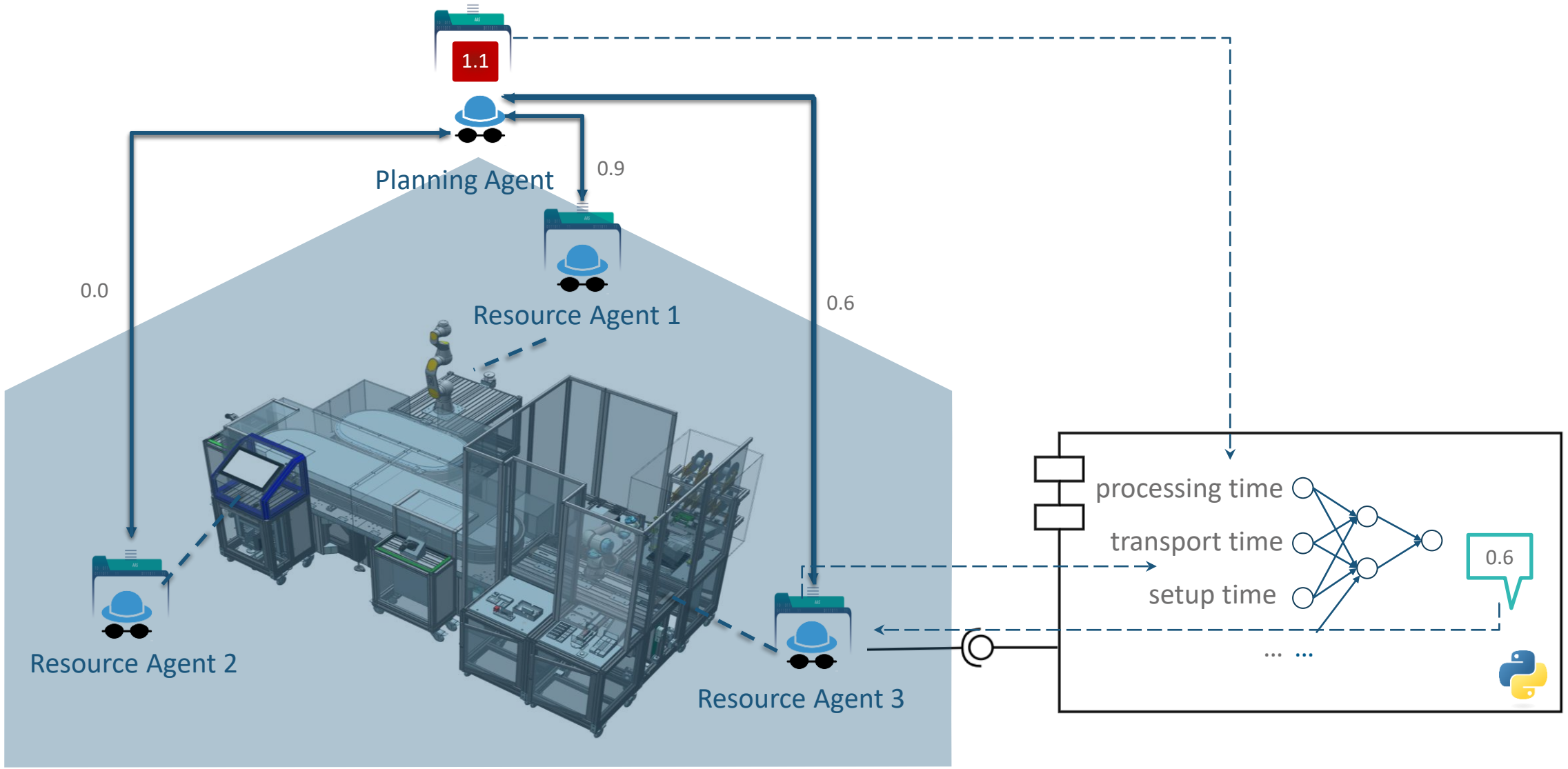
Auction based online scheduling using RL (ABOS-RL)



The Framework – Multi-Agent Systems



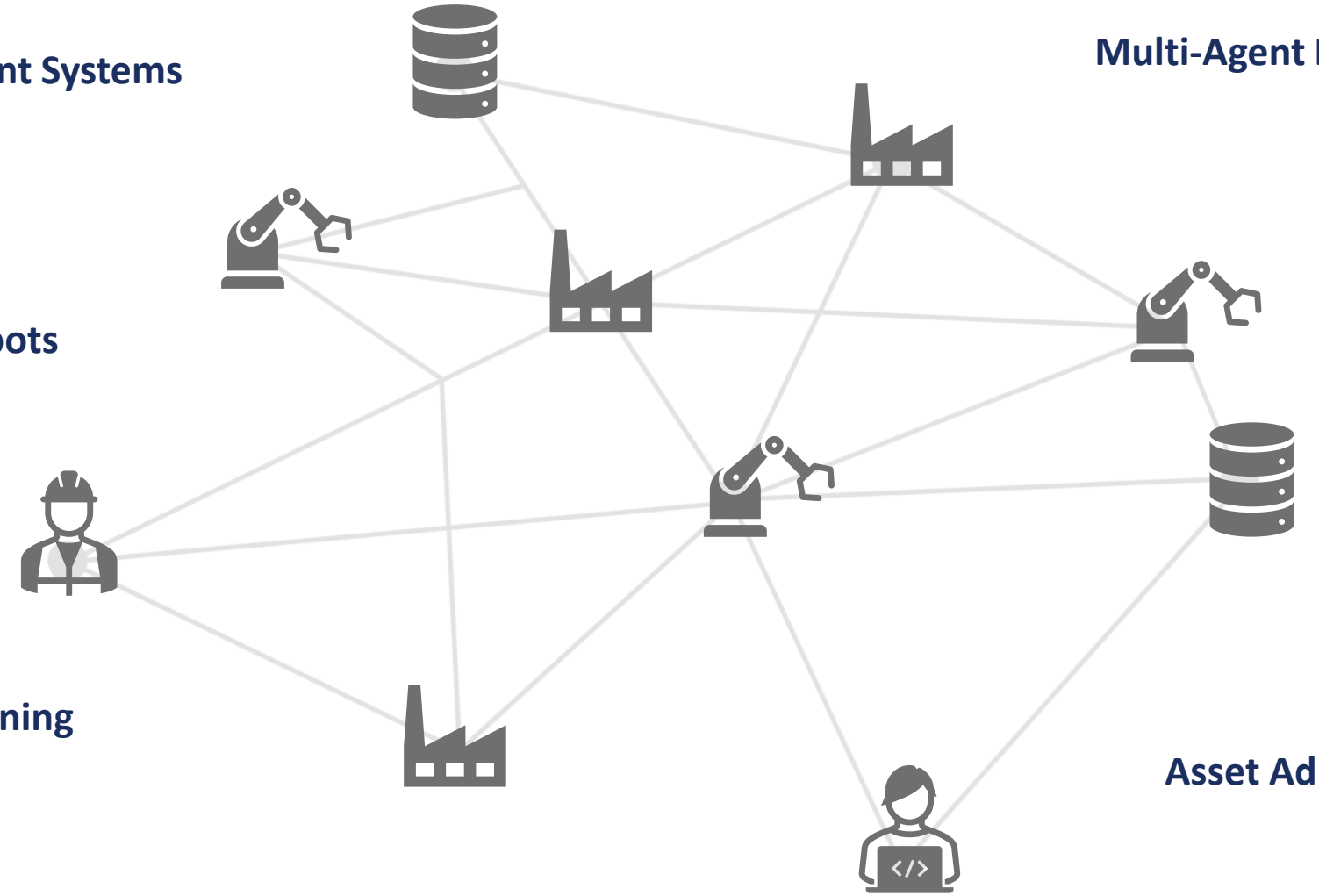
The Framework – Asset Administration Shells



Distributed Optimization via a Modular Production

Multi-Agent Systems

Multi-Agent Reinforcement Learning



Collaborative Robots

Distributed MILP

Federated Learning

Asset Administration Shells

1st European Symposium on Artificial Intelligence in Manufacturing

Abstract submission	31 May 2023
Abstract acceptance notification	2 June 2023
Paper submission	30 June 2023
Paper review notification	15 July 2023
Final submission	15 August 2023
Conference date	19 September 2023

Scope and Topics:

- AI for process monitoring, optimization and control
- AI for quality assessment and prediction
- AI for production planning, scheduling and control of manufacturing systems and value chains
- AI for flexible and precise robotics
- …

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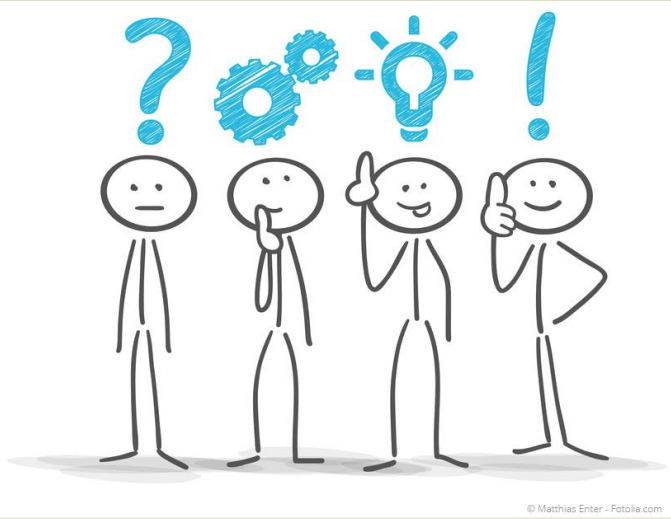
MAS4AI

Thank you!



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