



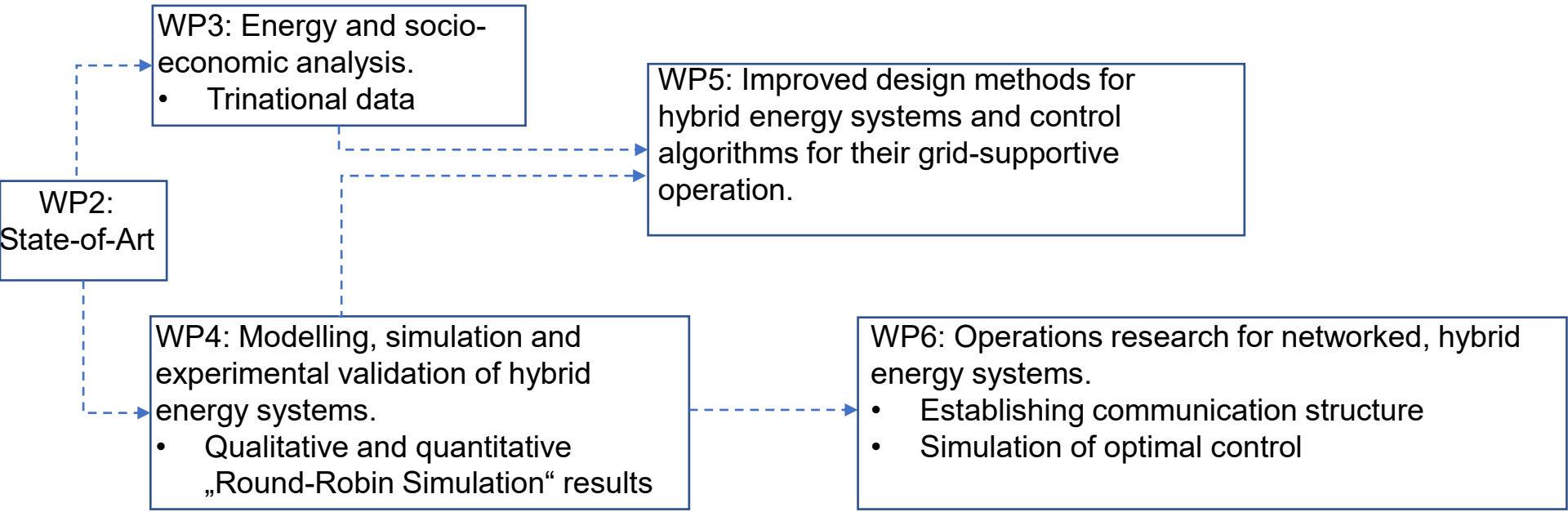
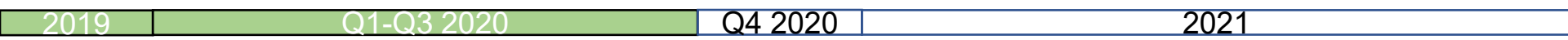
# *Outlook to ACA-MODES: System Simulation and Design and Control Optimization*

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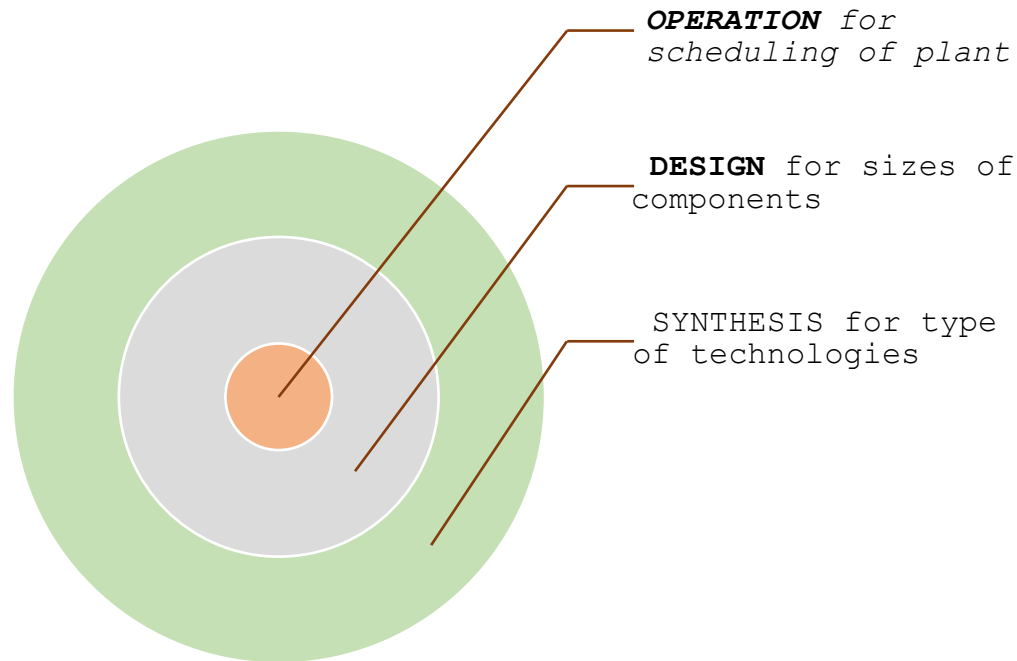
# Outlook 2020 to 2021

# Work packages, Tasks, and Outputs



# Design and Control Optimisation: Tasks from WP5 and WP6

## Three Levels of Energy System Optimization\*



### ▪ Design optimization demonstration

- Hybrid system: PV + Heat Pump + Storage
- Linear optimization problem with cost function
  - capital-related costs
  - CO<sub>2</sub>
  - primary energy consumption
- Regional analysis for **Oberrhein**
  - Primary energy factor
  - CO<sub>2</sub> factor
  - Load and weather profiles

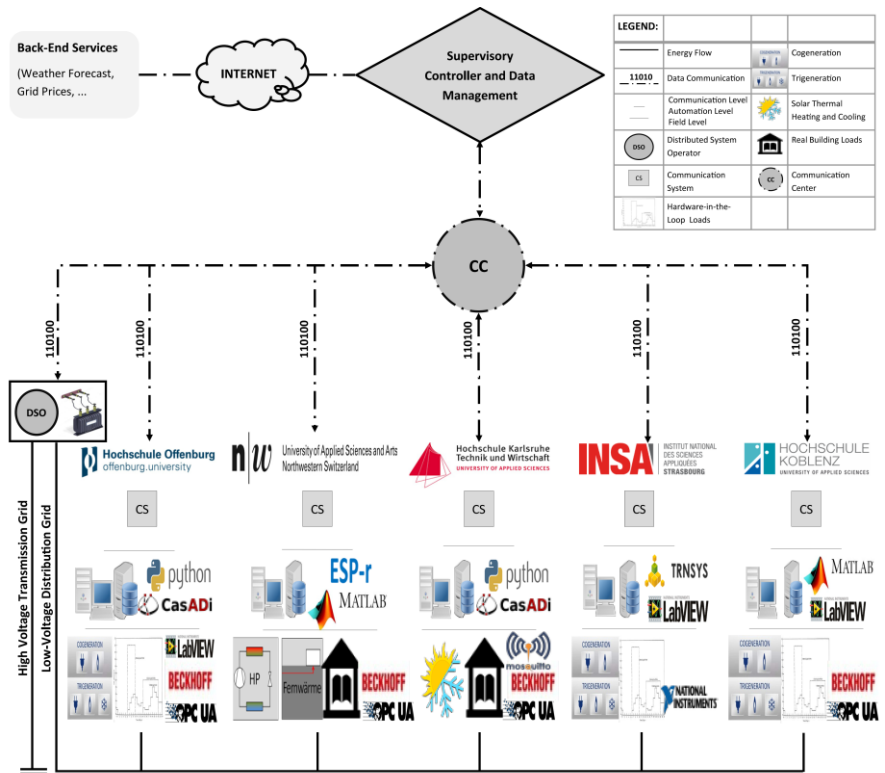
### ▪ Operation (control) optimization demonstration

- Each lab uses independent control algorithm
- Possibility to use solution algorithms being developed at University of Freiburg and Hochschule Karlsruhe

\*Urbanucci, L., 2018. Energy Procedia 148, 1199–1205. <https://doi.org/10.1016/j.egypro.2018.08.021>

# Work Package 6: Operations research

## Planned communication structure\*



### Challenges

- Definition of application scenario
- Formulation of supervisory controller
- Type of input signal for the individual controllers that considers regional weather forecast, grid status, rebound effects etc.

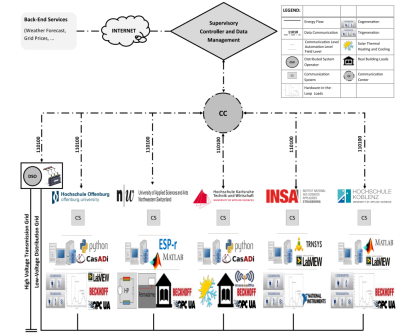
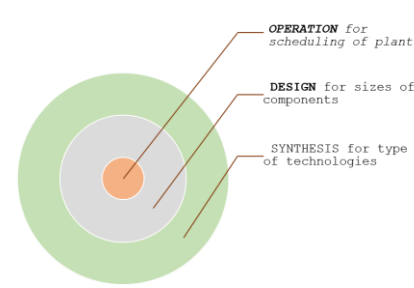
### Existing know-how

- Optimisation algorithms at Freiburg
- Demonstration of mixed integer optimal control at HS Offenburg and HS Karlsruhe using standard industrial components
- Usage of various communication protocols and database systems
- Usage of electricity spot price signal as a representation of grid-status

\*Figure available in project proposal appendix on project website

# Summary

- Project is on schedule
- Regional analysis
- Main challenges
  - Timely demonstration of individual control optimization in WP5
  - Development of supervisory controller and type of input signal in WP6
- Project internal and external discussions with industrial partners on possible approaches and their validation



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