

# MODEL PREDICTIVE CONTROL FOR HVAC SYSTEMS

an innovative path towards energy efficiency and better indoor environment quality

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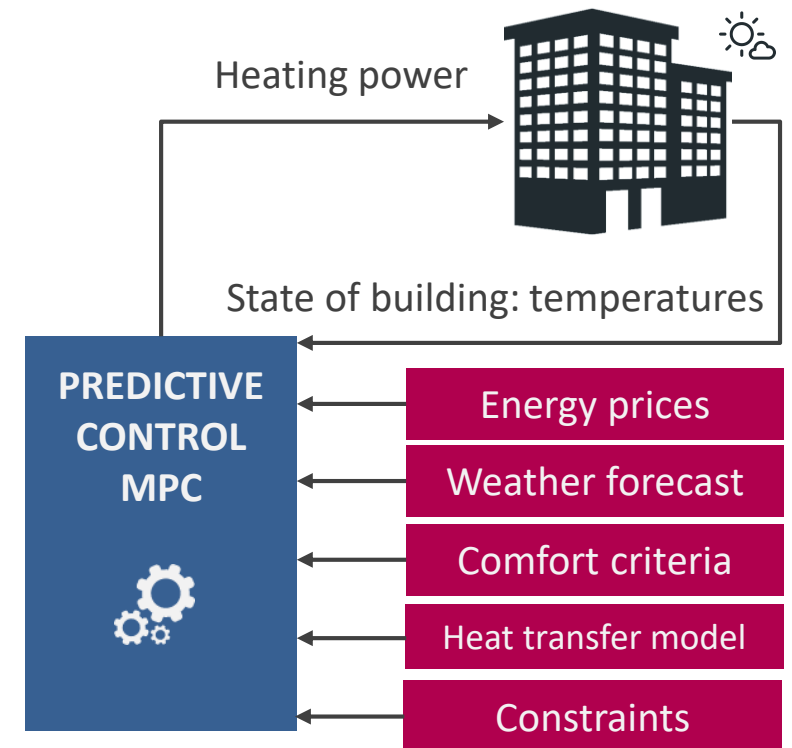
## MODEL PREDICTIVE CONTROL (MPC)

Advanced process control method suitable for control of complex multiple-input multiple-output systems

With regards to energy and buildings, the areas of possible applications:

- Hybrid energy systems
  - Multiple (renewable) sources
  - Energy storages
- Smart-grid and connected systems
  - District heating and cooling systems
  - Time-varying cost
- Complex control objectives

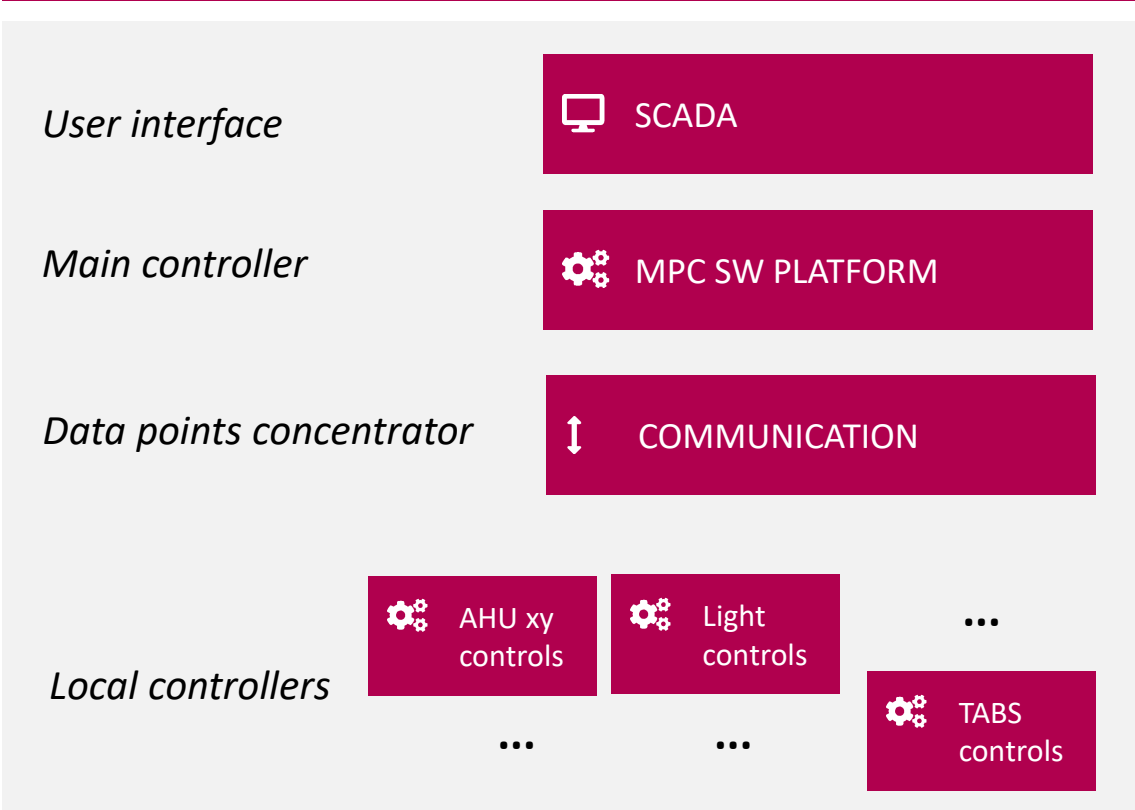
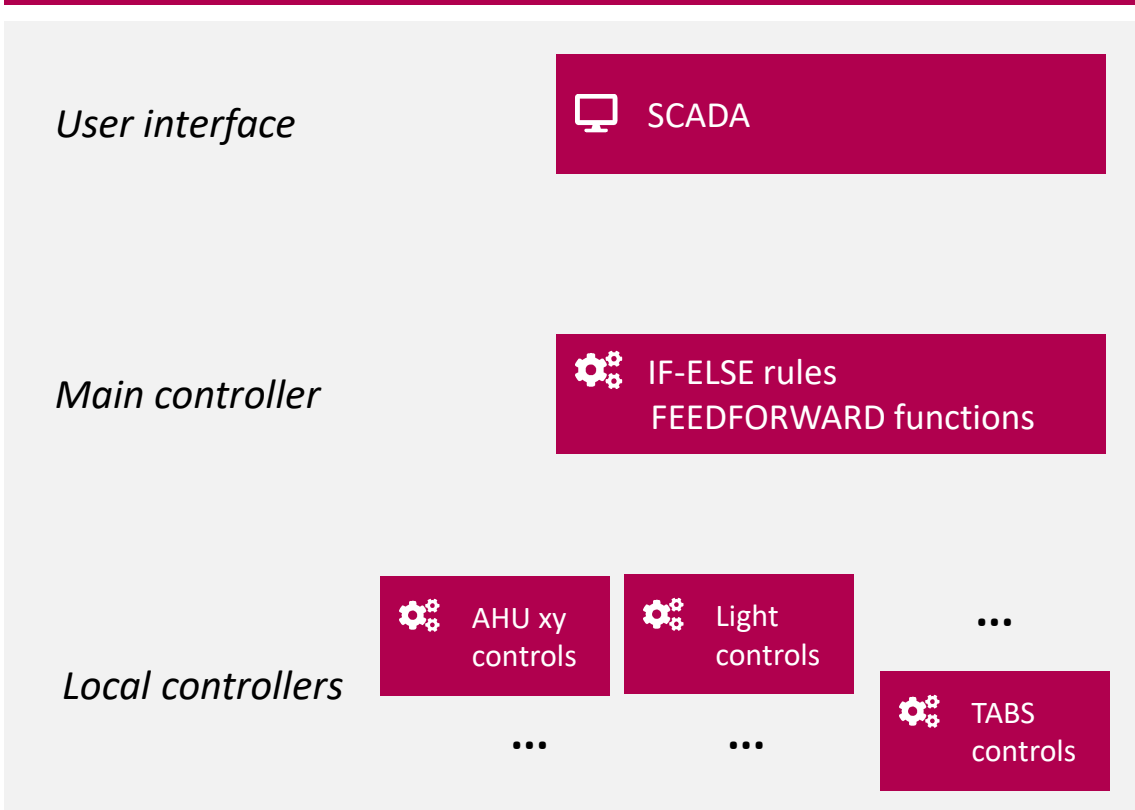
hybridGEOTABS project addresses all above points



# FROM TRADITIONAL TO MPC APPROACH IN BUILDINGS

## TRADITIONAL

## MPC



## PROS AND CONS MPC

- + Faster commissioning
- + Validation of critical situations in advance
- + More precise setpoint tracking – better comfort
- + Energy efficiency – achieve the comfort with minimum energy
- + Model based diagnostics of the operation of the HVAC components
- Model (set of equations) development
- Computational power, specialized libraries for numerical optimisation



hybrid  
**GEOTABS**

Controlling the power of the ground by integration

## MPC BUILDINGS



INFRAX, Dilbeek BE  
2200m<sup>2</sup> GEOTABS



School, Libeznice CZ  
1000m<sup>2</sup> GEOTABS



University building, Prague CZ  
70000 m<sup>2</sup> TABS  
Energy savings 20%



Office LBM, Prague CZ  
450 m<sup>2</sup> TABS  
Energy savings 23%