IBPSA Project 1

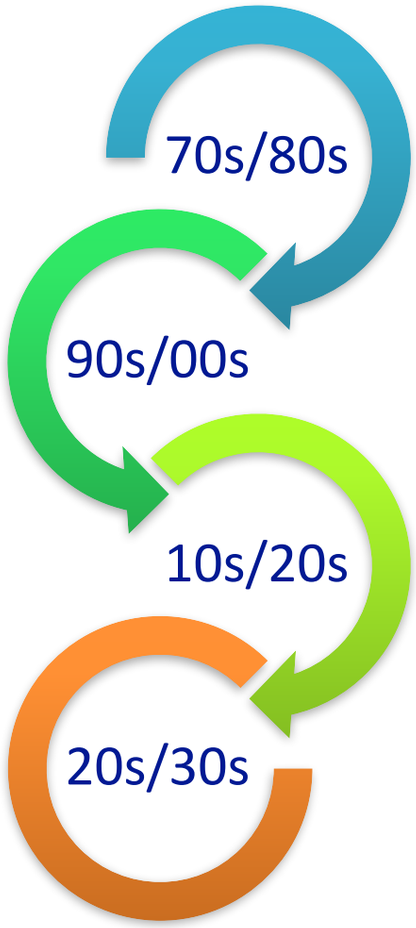
BIM/GIS and Modelica Framework
for
building and community energy system
design and operation

WP 1.1- Modelica Library for Design and Operation

October 18, 2021

Michael Wetter

Work Package 1.1 Goal

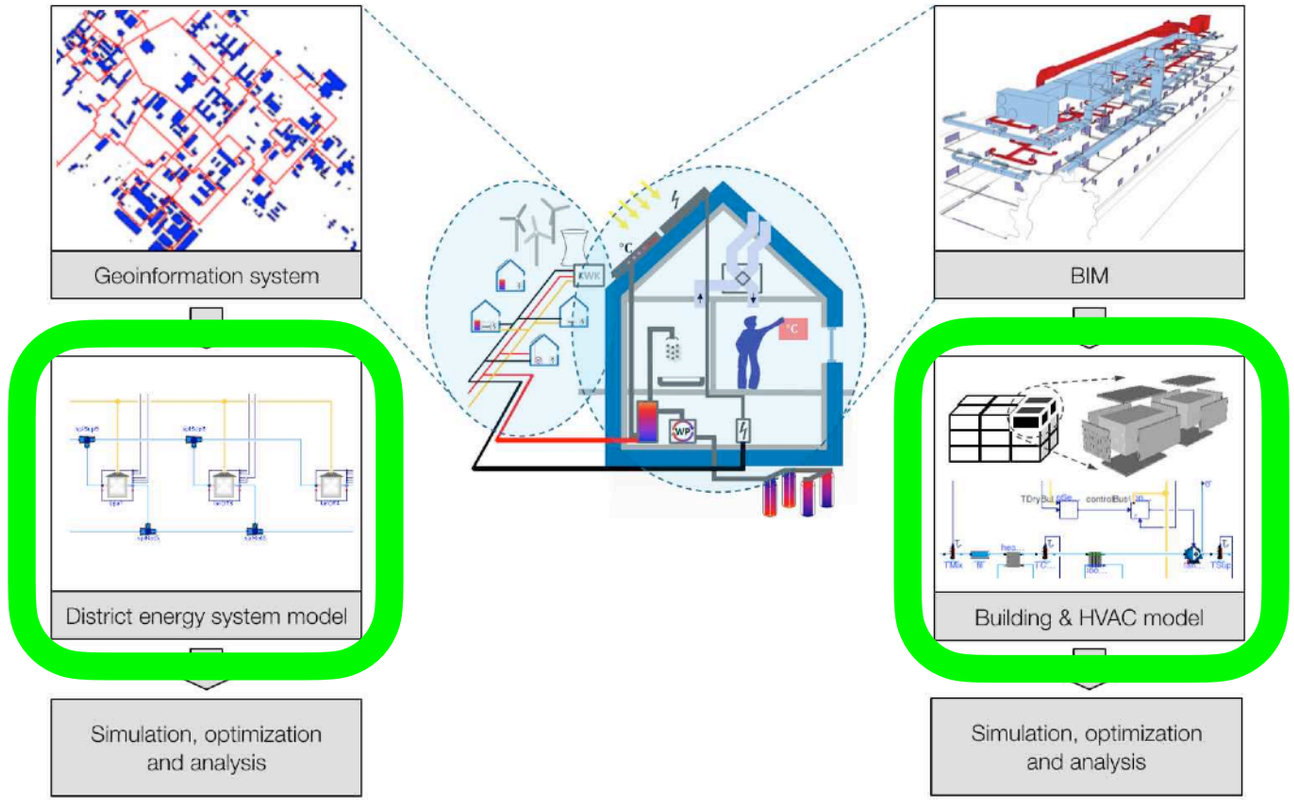


Simulation

Modeling

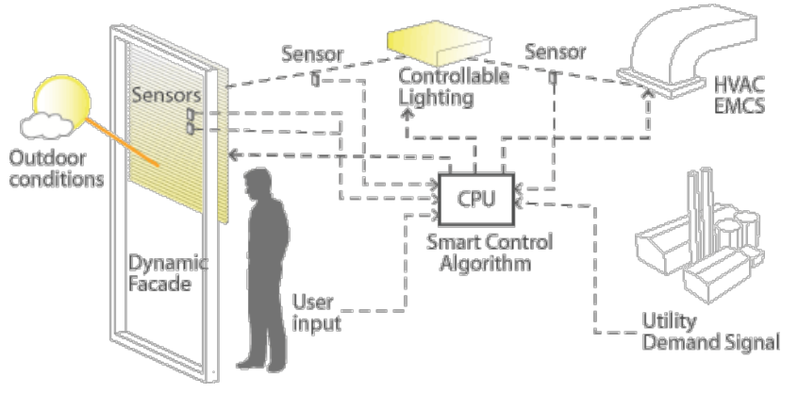
Tool integration

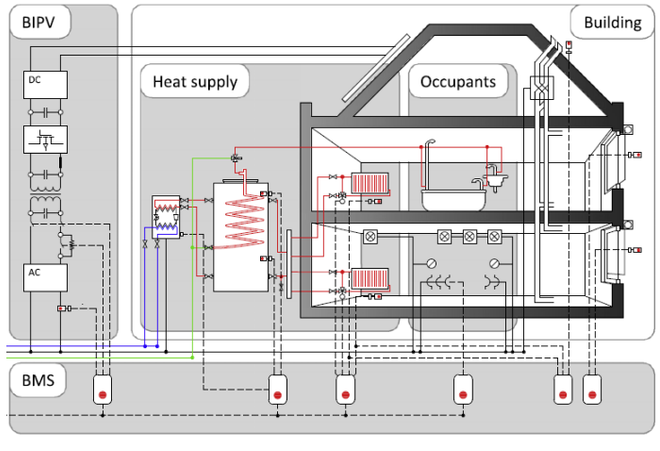
Autonomous modeling

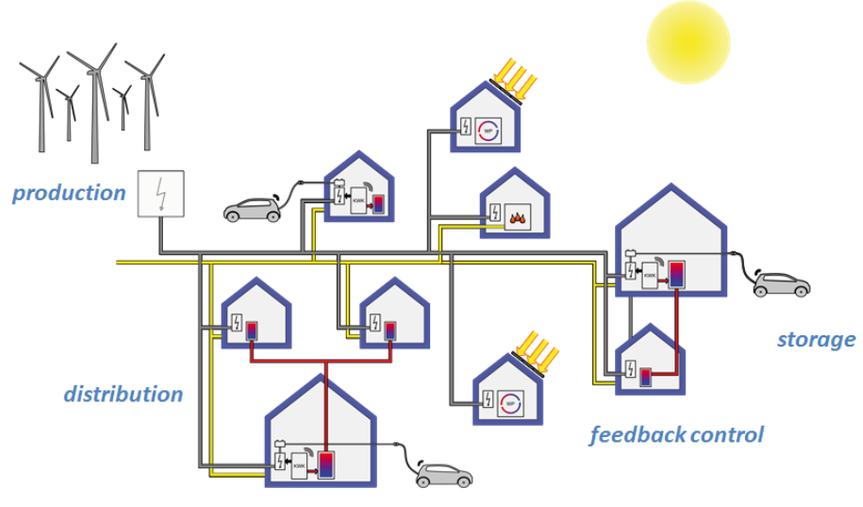


Develop Modelica library applicable for system-level autonomous modeling.

- validated
- well documented
- state-of-the-art physics and dynamics







From controls to buildings and communities

Progress in last half year - Modelica IBPSA Library

Around 25 pull requests have been merged to the master

BoundaryConditions

- Improved calculation of solar irradiation based on new BESTEST for weather data processing https://github.com/ibpsa/modelica-ibpsa/pull/1520
- WeatherData.ReaderTMY3 sends location altitude and latitude to weather bus, and solar radiation model no longer require this parameter to be entered by users

Fluid

- Refactored PlugFlowPipe to make it symmetrical, and plug compatible with other resistance models https://github.com/ibpsa/modelica-ibpsa/pull/1503
- Simplified filter of actuators and mover control input https://github.com/ibpsa/modelica-ibpsa/pull/1499

Media

- Improved accuracy and simplified equations for steam model https://github.com/ibpsa/modelica-ibpsa/pull/1395

Numerous smaller improvements.

Progress in last half year - Modelica IBPSA Library

MSL 4.0

- Tested with MSL 4.0, plan to upgrade this fall/early winter.

OpenModelica

- LBNL and OpenModelica development team collaborate
- All models of Buildings 7.0.x, and through this likely all of IBPSA, will translate with OpenModelica by next February
- IBPSA: All but one model translates, 95% of models simulate.

Challenge problems

- Repository of challenge problems in response to last Expert Meeting to be reviewed in breakout session.

Progress in last half year - BuildingsPy

6 pull requests have been merged to the master

Mainly improvements for

- robustness of CI testing
- improvements to merging and refactoring libraries

Breakout sessions

Session 1		
	New and upcoming developments of individual libraries	Filip Jorissen - IDEAS
		Christian Vering - AixLib
		Christoph Nytsch-Geusen - BuildingSystems
		Michael Wetter - Buildings
	Discussion New models for IBPSA Library	
Session 2		
	Cooling coil model	Donghun Kim and Antoine Gautier
	Heat Pumps	Fabian Wüllhorst and Christian Vering
	Modelica Challenge Problems	Michael Wetter
	PV and battery model	Laura Maier and Christian Vering