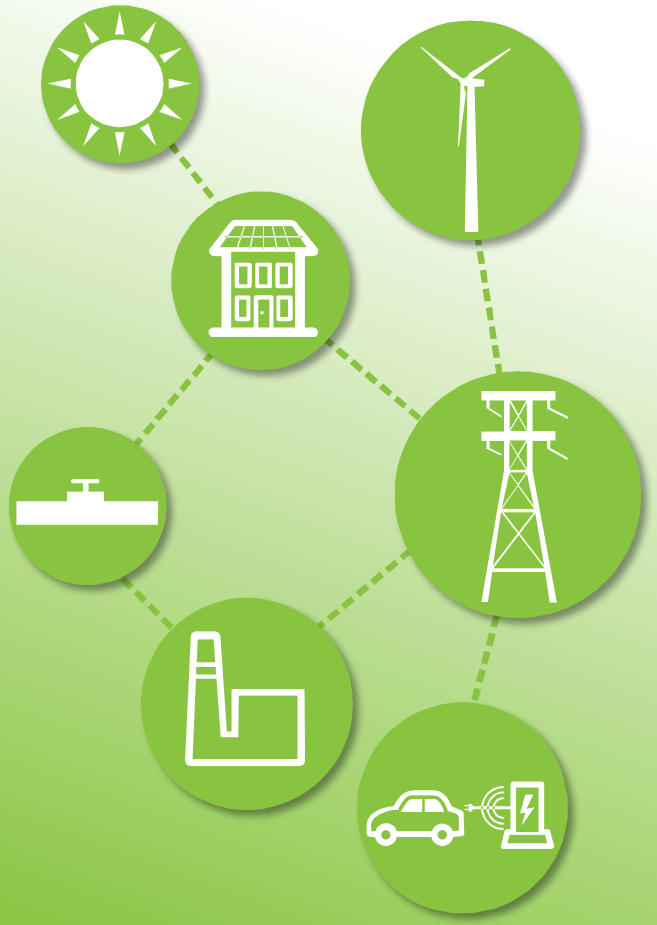
Spine



SpineOpt:
A flexible energy system modelling framework in Julia

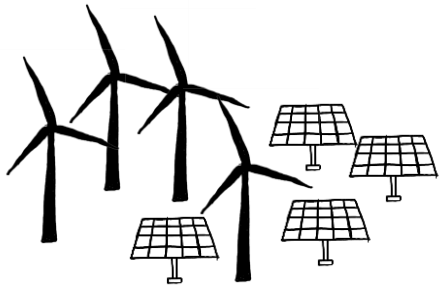
Erik Delarue, Topi Rasku, Jody Dillon and Maren Ihlemann

7 September 2021

Agenda

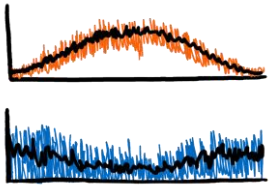
- Motivation & Key features of SpineOpt
- Basics of SpineOpt (~20', Maren Ihlemann)
  - SpineOpt building blocks
  - Live Demo
- Flexible temporal structure (~10', Topi Rasku)
- *Break*
- Flexible stochastic structure (~10', Topi Rasku)
- Representation of different energy sectors (10', Jody Dillon)
- Accommodating increased detail and complexity (10', Jody Dillon)
- Q&A

Motivation: Why have the requirements for energy system models changed?



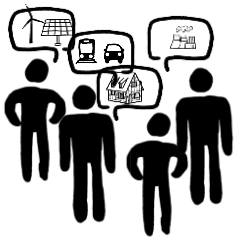
More (variable) renewable energy sources

More uncertainties



Short-term detail in long-term planning models

More integration across energy sectors



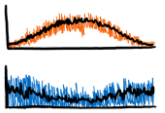
More collaboration needed between different stakeholders

Models become more and more complex

Key features of SpineOpt

Generic concept

- Generic data structure
- Flexible temporal structure
- Flexible stochastic structure
- Flexible linking of models/Decomposition



Multi-sector modelling & wide range of **applications**

- Long-term planning, Detailed UC, Hydro scheduling, Heat system optimization, Gas network optimization …

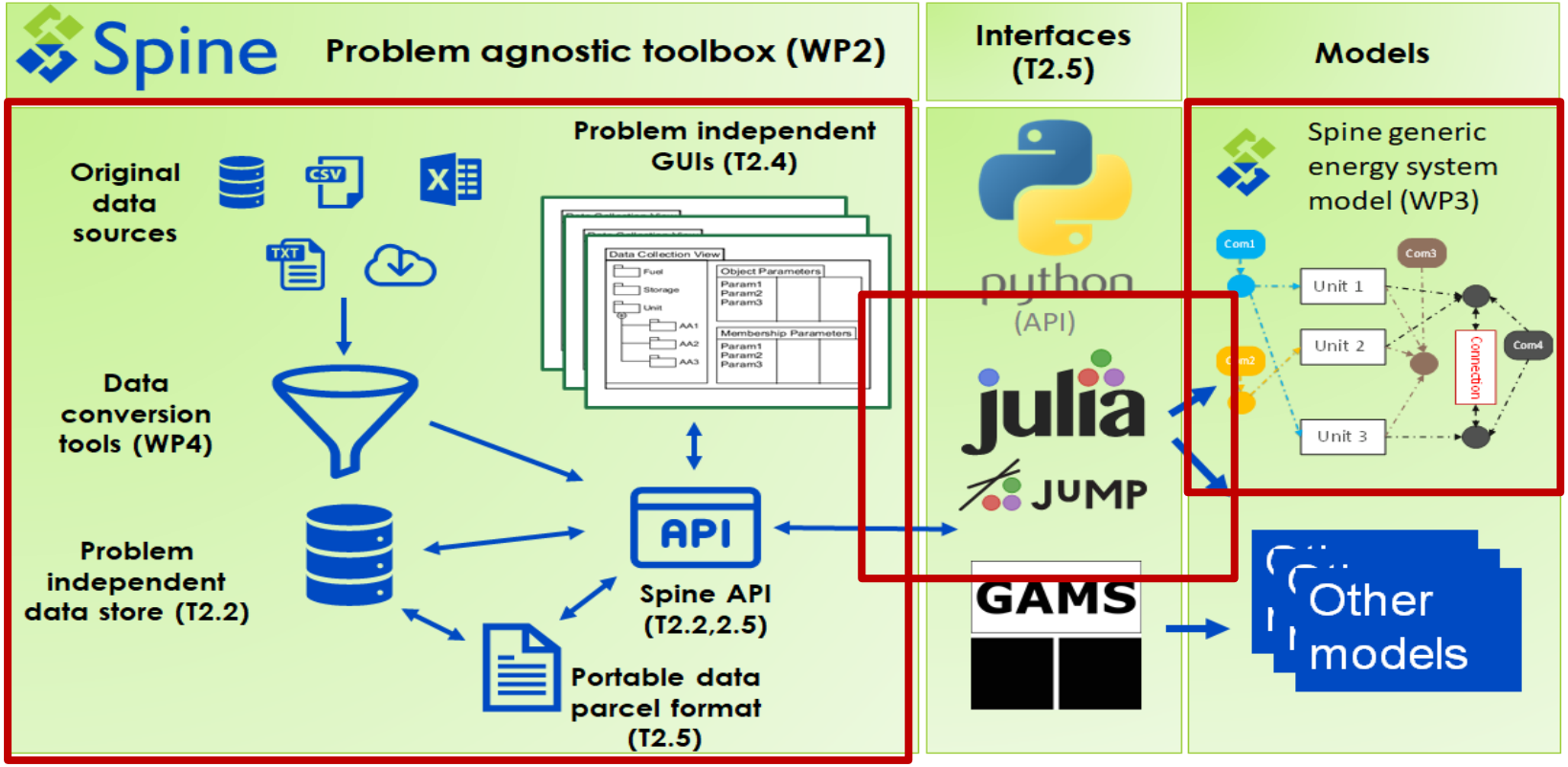
Fully **open-source**

- Julia (SpineOpt; ~back-end)
- Python (toolbox; ~front-end)
- Github (Development)

github.com/Spine-project/SpineOpt.jl
spine-project.github.io/SpineOpt.jl/latest/

Spine

Basics of SpineOpt: Spine Project Overview



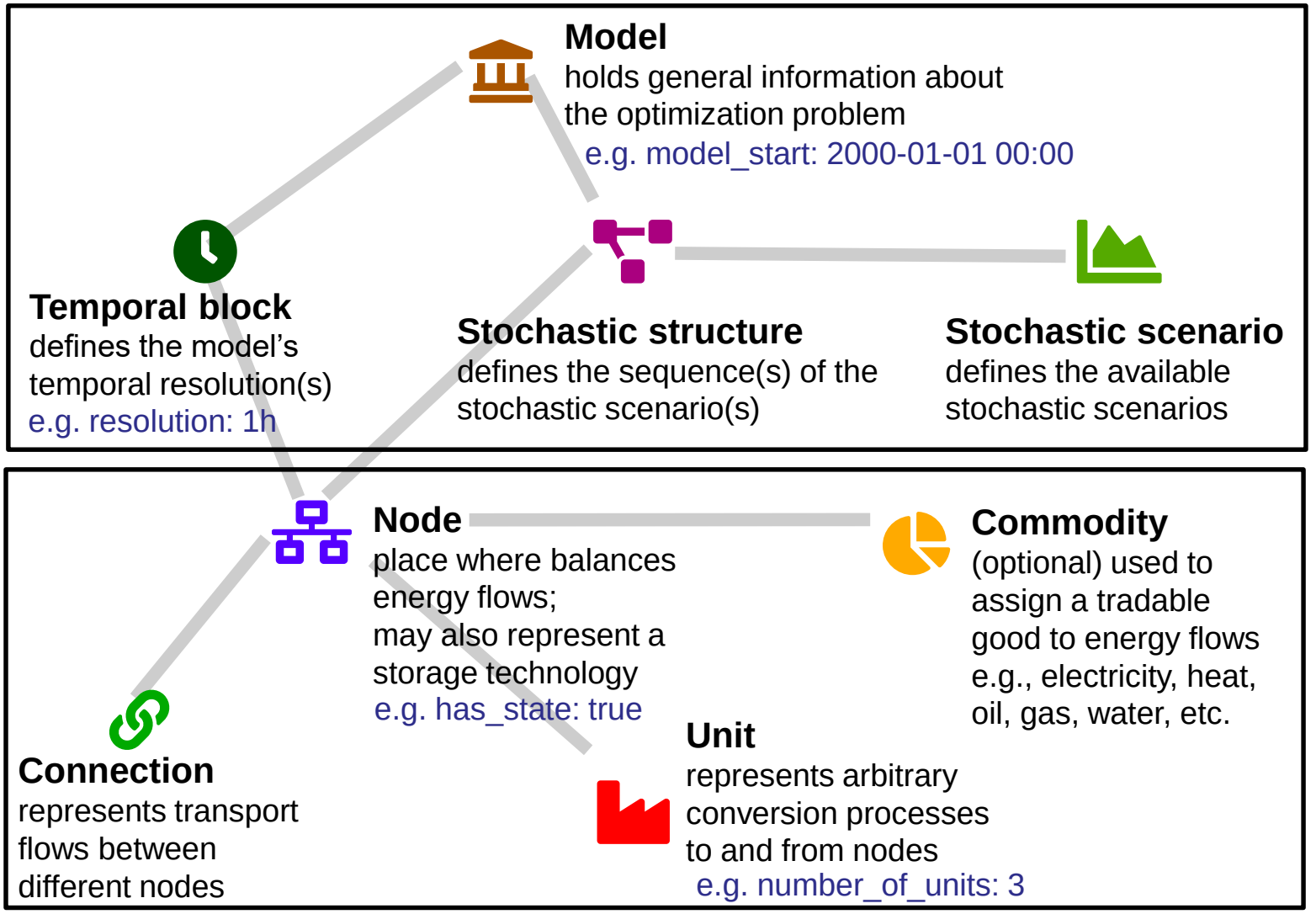
Sep 8, 17:00-18:30 CEST

Sep 10, 14:00-15:30 CEST

today

Applications: Sep 9, 14:00-16:00 CEST

Basics of SpineOpt: SpineOpt's building blocks

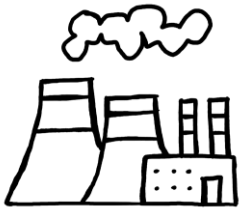


Spine

Live Demo: Basic energy system model

Gas price:
5€/MWh

1 Gas Plant
Efficiency:
40%



Capacity/unit:
50 MW (El)

Demand/MW:

00:00	10
01:00	20
02:00	40
03:00	50
04:00	30

Capacity
/unit:
20 MW

3 Wind turbines
Availability:

00:00	0.2
01:00	0.1
02:00	0.5
03:00	0.1
04:00	0.2

Spine

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