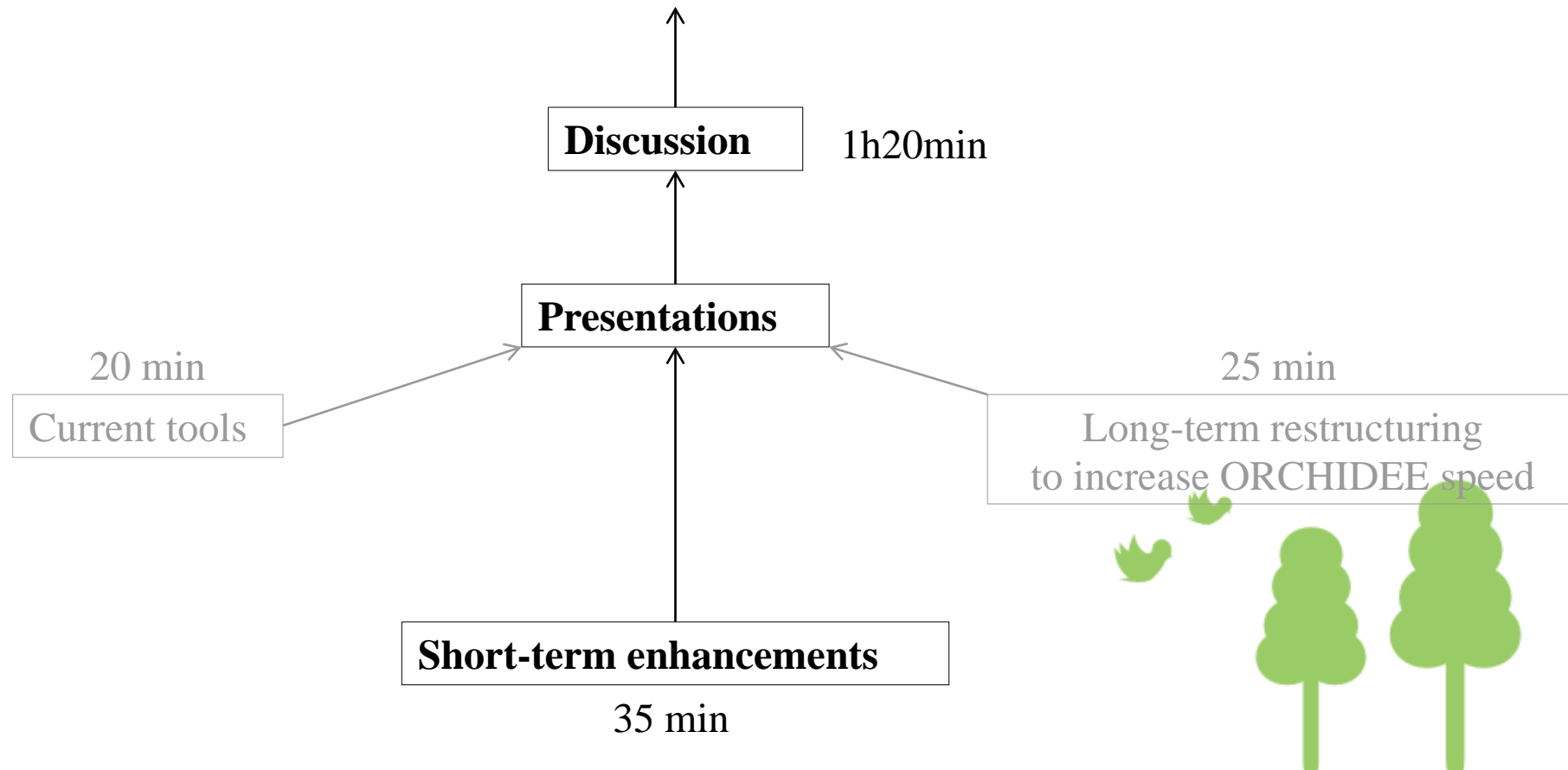# Enhancing the traceability, documentation, use and estimation of parameters

Objective : Agree on a plan to integrate parameter traceability into ORCHIDEE

Discussion 1h20min

Presentations

20 min

Current tools

25 min

Long-term restructuring
to increase ORCHIDEE speed

Short-term enhancements

35 min

Please limit discussion during presentations to clarifying questions !
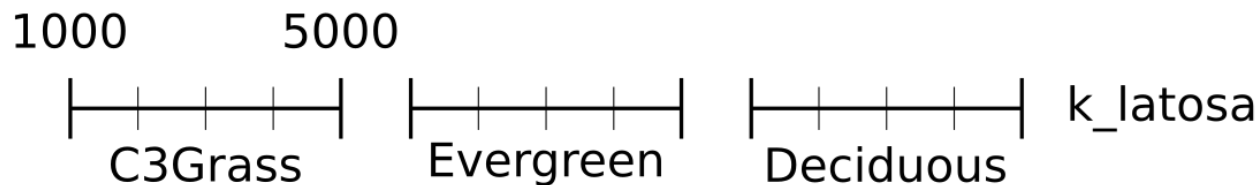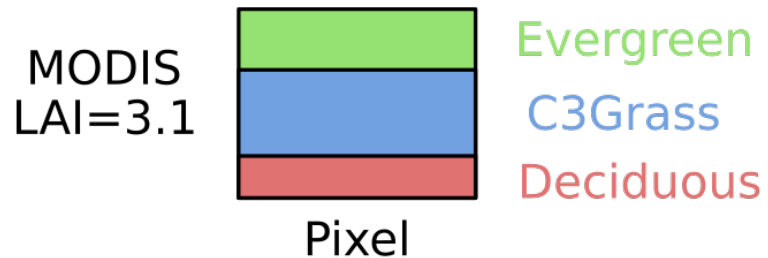
Why do we want to speed up ORCHIDEE ?

- Computational time per simulation year varies depending on multiple factors

- Simple estimate is 1 minute per simulation year

- CAN will be more expensive due to radiation budget

How does this relate to parameters?

- Parameter optimization
  - Choosing parameters within an uncertain range
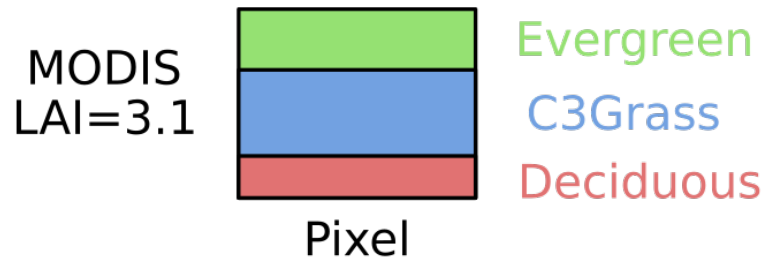 - Spinup for carbon and nitrogen

How does this relate to parameters?

- Parameter optimization
  - Choosing parameters within an uncertain range
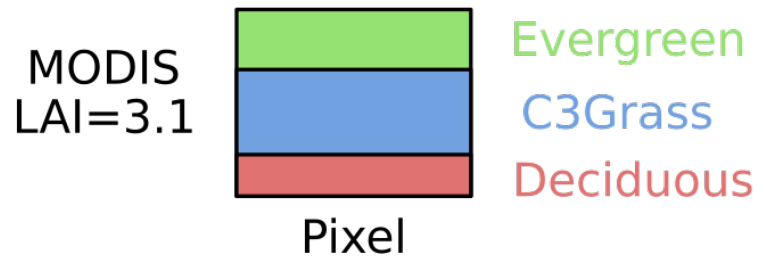 - Spinup for carbon and nitrogen

How does this relate to parameters?

- « Equifinality »

MODIS LAI=3.1

Evergreen

C3Grass

Deciduous

Pixel

1000   5000

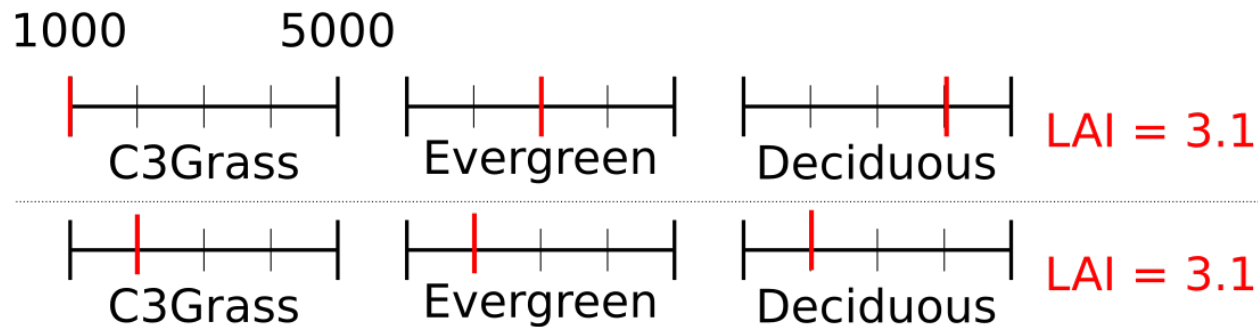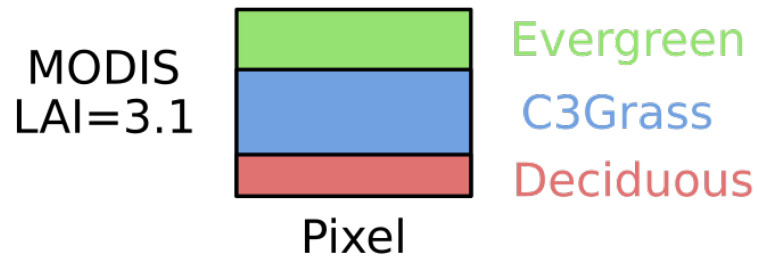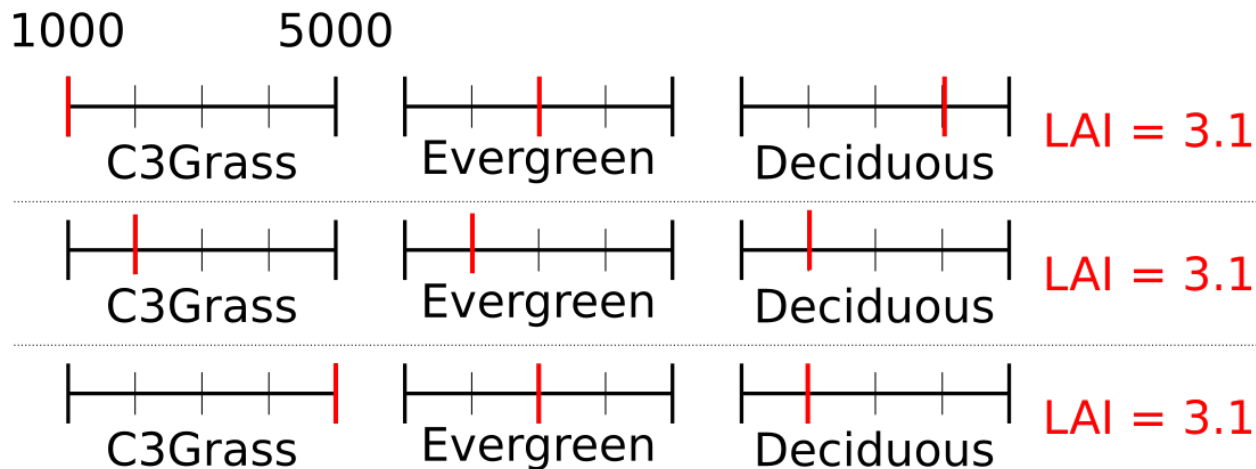C3Grass   Evergreen   Deciduous   LAI = 3.1

How does this relate to parameters?

- « Equifinality »

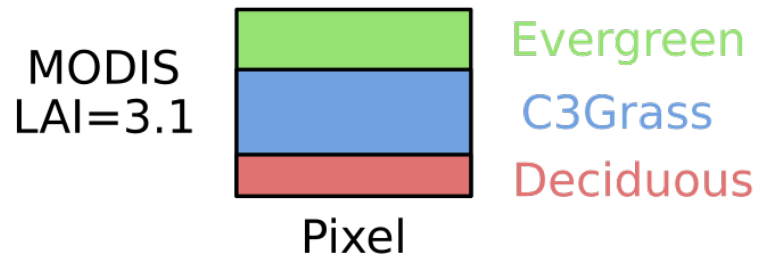# How does this relate to parameters?

- « Equifinality »

MODIS LAI=3.1

Evergreen
C3Grass
Deciduous

Pixel

1000   5000

C3Grass   Evergreen   Deciduous   LAI = 3.1

C3Grass   Evergreen   Deciduous   LAI = 3.1

C3Grass   Evergreen   Deciduous   LAI = 3.1
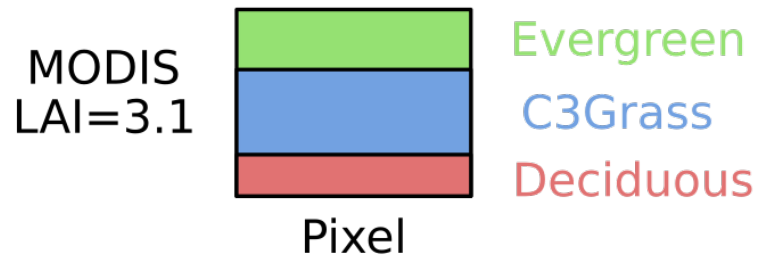
How does this relate to parameters?

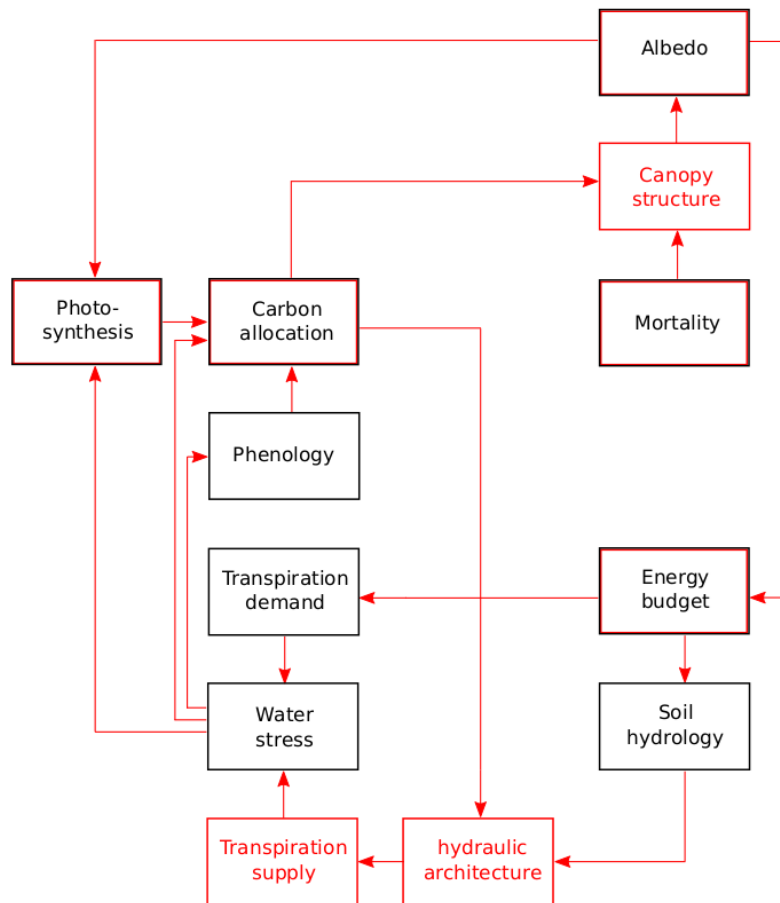- « Equifinality »
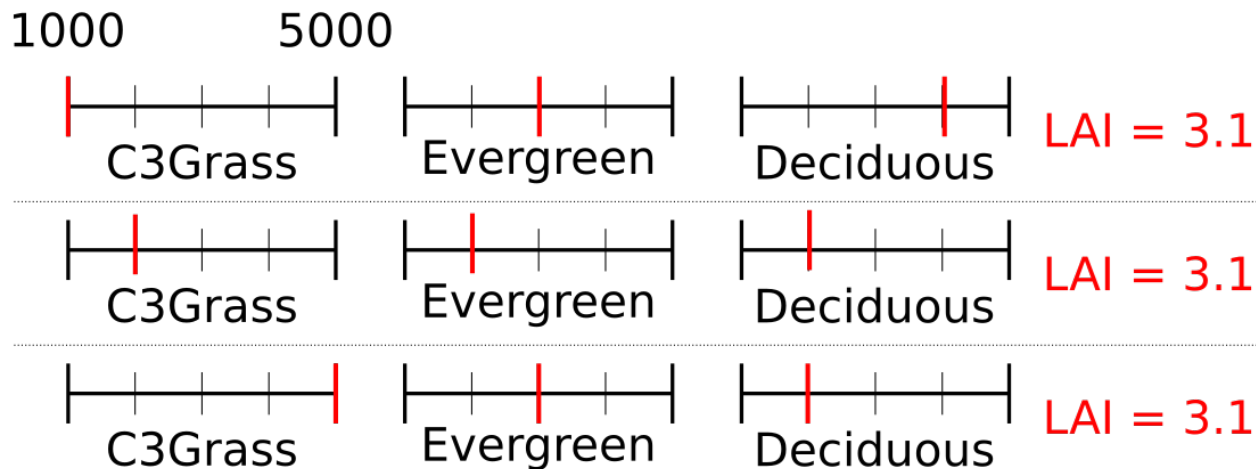
How can we speed up ORCHIDEE ?

- First, how much faster do we need to go ?

- ANSWER: one to two orders of magnitude

- Code optimization ?

- Faster hardware ?

- Increased paralellization ?

Emulation

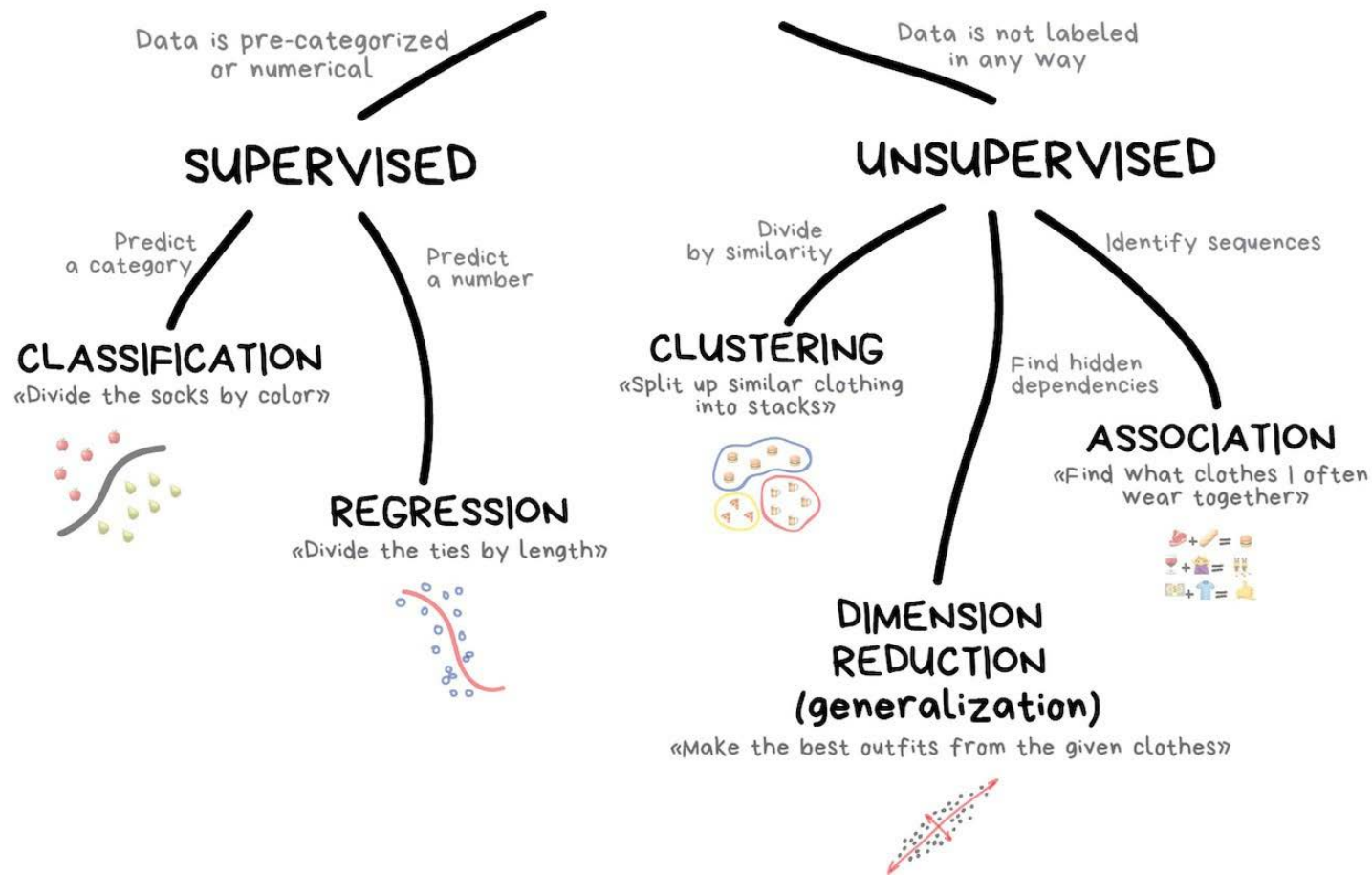- Identify expensive subroutines/processes, and replace them by simpler models

- Target slowly changing subroutines and replace them with
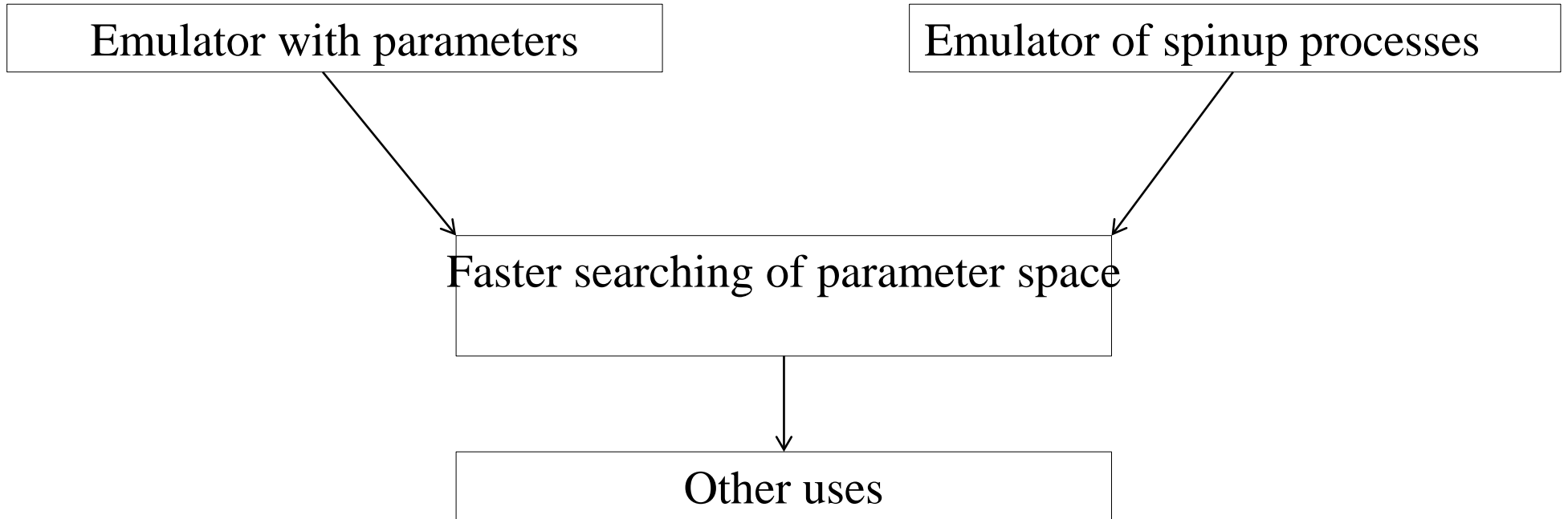- Ideally, *emulate the whole model*, with parameters as an inp
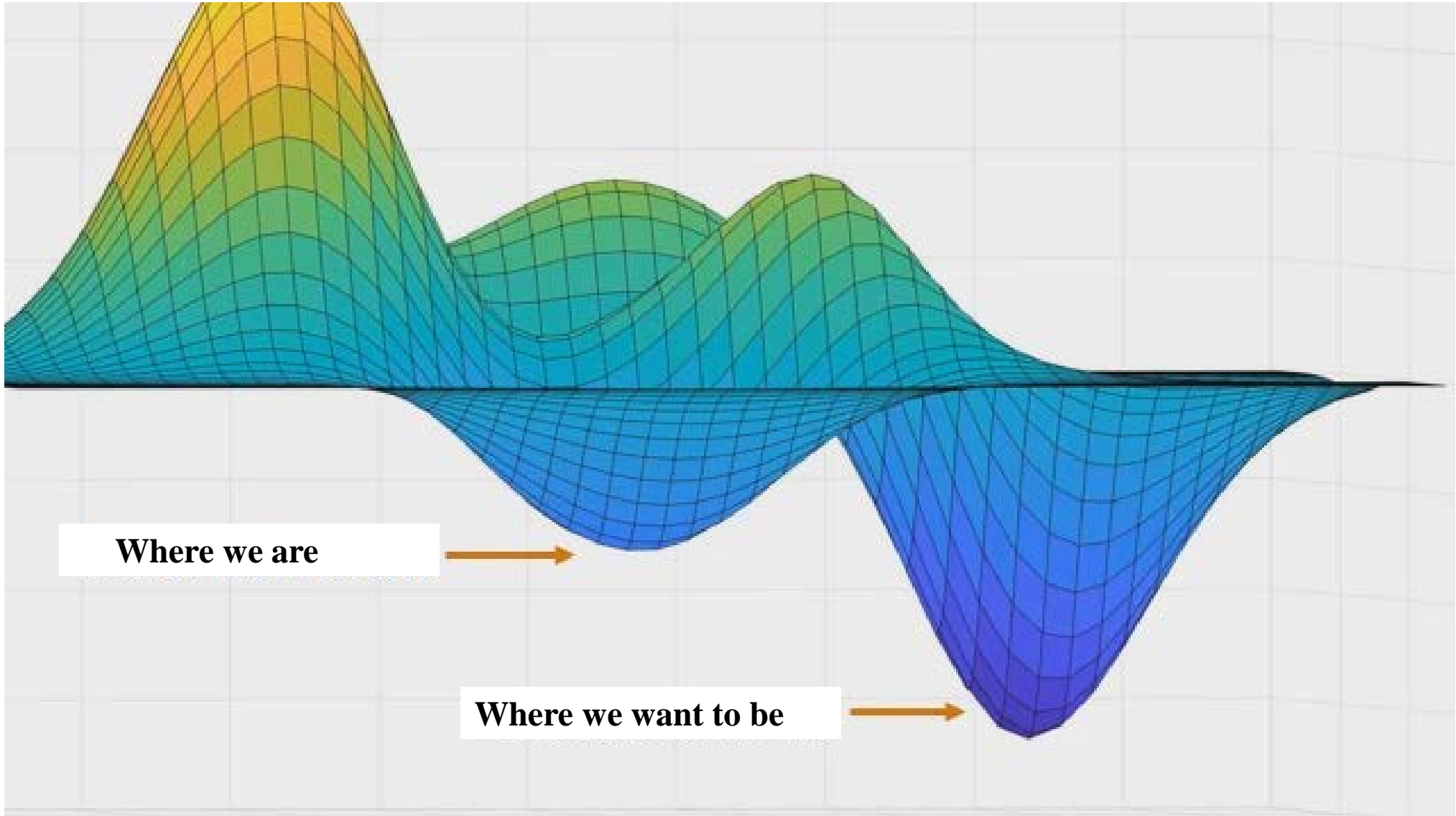
What kind of emulator ?

Results

Where we are

Where we want to be