CellML 1.1 – best pactice guidelines for heart cell models

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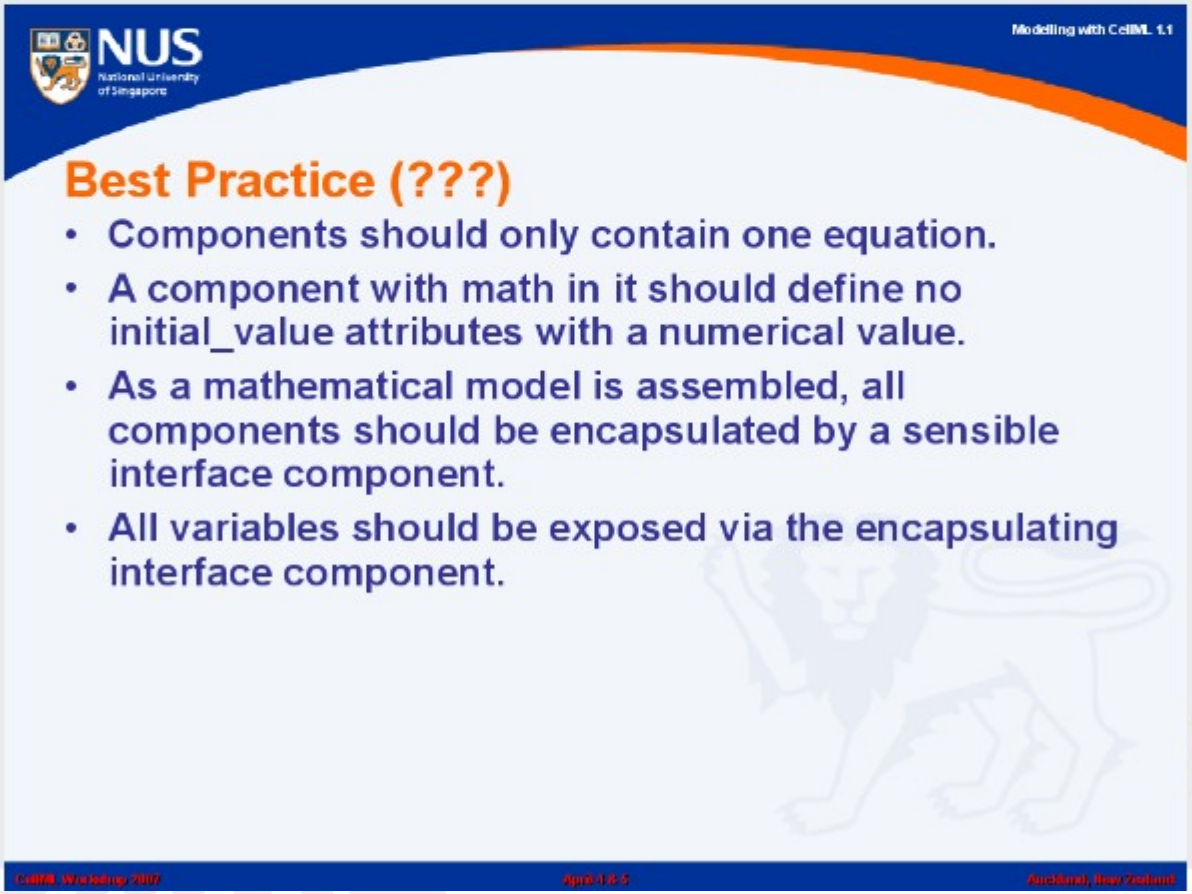
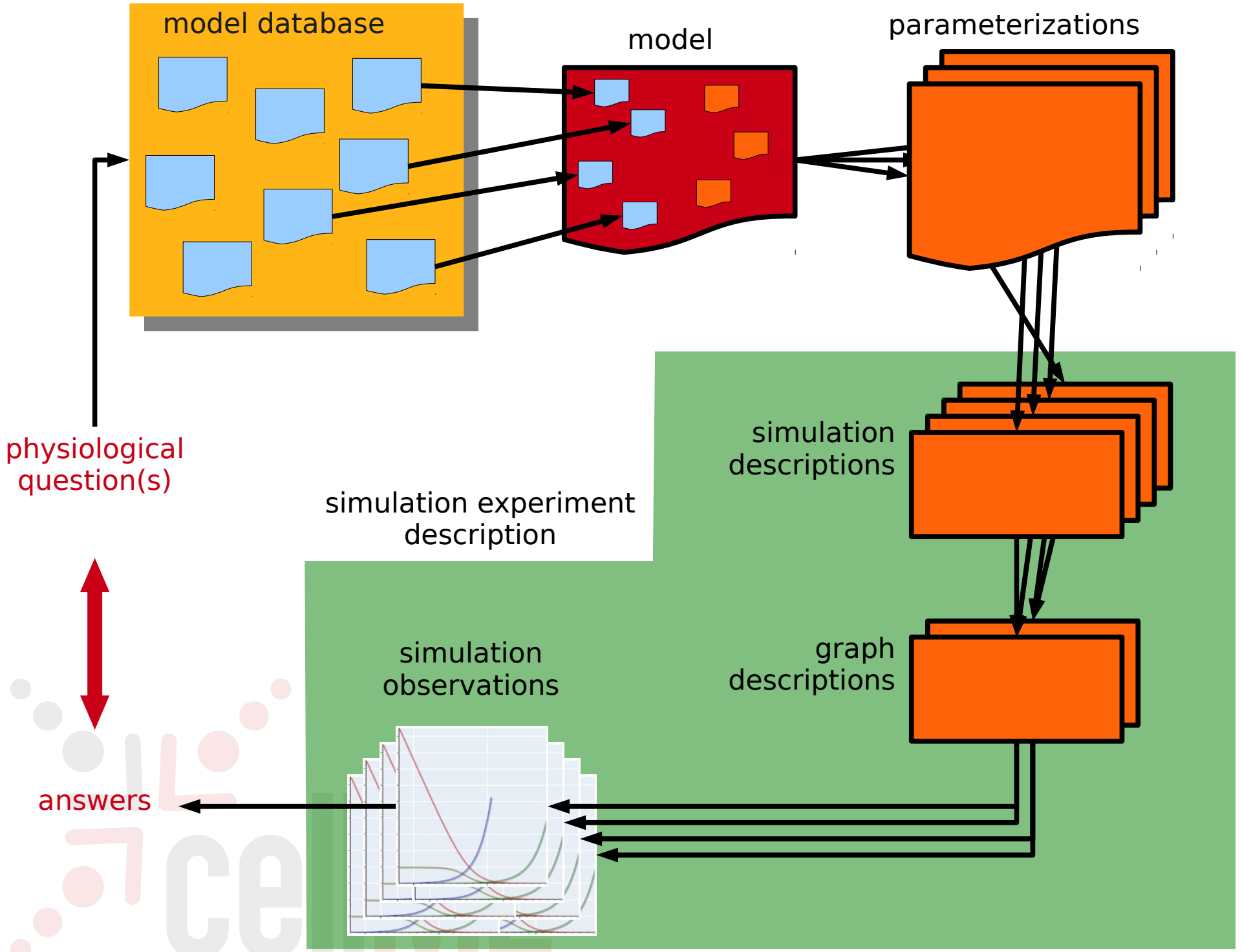
Enhancing Modularity in CellML

- Guidelines on the use of CellML 1.1 to ensure we all create models suitable for re-use by the community wherever possible...




model database
model
parameterizations
physiological question(s)
simulation experiment description
simulation descriptions
graph descriptions
simulation observations
answers

Cardiac cell models

- Extensive historical record
- Generally quite modular
  - ion channels
  - concentrations
  - electrics, mechanics, energetics...
- Recurring common mathematical formulations
  - Hodgkin-Huxley gating kinetics, Nernst potential...
- Good candidate for the use of CellML 1.1?

CellML 1.1 & heart cell models

- Works well if a consistent interface is imposed on all aspects of the modeling workflow
  - consistent units, same physical quantities
  - (100's of models in the repository...)
- Adaptors can be written to connect “incompatible” sub-models
  - very flexible
  - adapters need to be customized (single use?)
  - **extensive** historical record!

Adapter models

- Only practical solution...for now
- Is a generalized solution possible?
  - extract common features (flux summation, ion concentrations...)
  - will drop out over time
- Can the creation of adapter models be automated?
  - Model annotation becomes even more important!
  - library of template adapters?

Impose a standard interface

- Can we specify a standard interface for all heart cell models?
- Will only work for new model descriptions
- Is it worth doing if only works with heart cell models?
  - we want to model the whole body, right?

What can you do now?