CHALLENGES OF SCIENTIFIC MODELLING

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https://github.com/Jnsll/ModelisationScientifique

What does ‘modelling’ mean ? What about ‘scientific modelling’ ?

What ? Why ? How ?

What is 'modelling'?

Model

From Wikipedia, the free encyclopedia

Model, **modeling** or **modelling** may refer to:

- Conceptual model, a representation of a system using general rules and concepts
- Physical model or plastic model, a physical representation in three dimensions of an object, such as a globe or model airplane
- Scale model, a representation of an object which maintains general relationships between its constituent aspects
  - Architectural model, a scale model for studying aspects of an architectural design or to communicate design ideas
- Scientific model, a simplified and idealized understanding of physical systems

What is 'scientific modelling'?

Scientific modelling

From Wikipedia, the free encyclopedia

Scientific modelling is a scientific activity, the aim of which is to make a particular part or feature of the world easier to understand, define, quantify, visualize, or simulate by referencing it to existing and usually commonly accepted knowledge. It requires selecting and identifying relevant aspects of a situation in the real world and then using different types of models for different aims, such as conceptual models to better understand, operational models to operationalize, mathematical models to quantify, and graphical models to visualize the subject.

https://en.wikipedia.org/wiki/Scientific_modelling

What is 'scientific modelling'?

- ✘ Abstraction / representation of a system
- ✘ To learn about the represented system
- ✘ By using simulation, visualisation, ...
- ✘ Usually **a lot of data** manipulated as input or output

Scientific modelling is using more and more computing resources

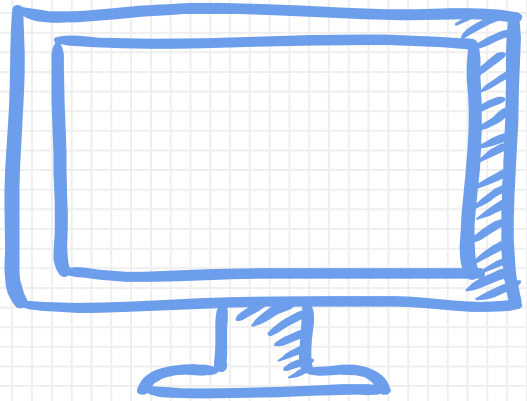
- ✘ Storing data
- ✘ Running simulations
- ✘ Visualisation (eg. graphs, maps)
- ✘ Exploring (calibration, sensitivity analysis, etc)
- ✘ Processing data (pre-processing, post-processing)

Some challenges

- ✘ Scalability
- ✘ Interactivity
- ✘ Collaboration
- ✘ Version control
- ✘ Reproducibility

Tools are developed in SE to tackle them

- ✘ helping scientists to model
- ✘ scientists are not expected to have the expertise in SE



Which tools ?

Let’s look into !

Python

The programming language !

Why Python ?

- ✘ Widely used
- ✘ Especially in the scientific community
- ✘ Lots of specific scientific tools built around it

https://insights.stackoverflow.com/survey/2019#most-popular-technologies

A little bit about Python

- ✘ Created by Guido van Rossum
- ✘ First released in 1991
- ✘ General-purpose programming language
- ✘ Interpreted language (as opposed to compiled)
- ✘ Dynamic typing
- ✘ Can be used interactively
- ✘ Open-source licence
- ✘ Multi-platform

A little bit about Python

- ✘ Different versions of Python exist
  - ✗ Python2 : deprecated

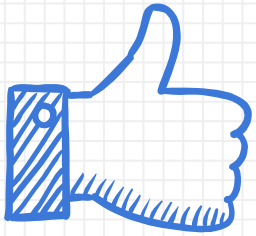
"Being the last of the 2.x series, 2.7 will receive bugfix support until 2020. Support officially stops January 1 2020 [...]"

–https://www.python.org/dev/peps/pep-0373/

  - ✗ **Python3**

References

- https://docs.python.org/3.8/tutorial/index.html#tutorial-index
- https://www.thoughtco.com/what-is-python-2813564



THANKS!

Any questions?