

CHALLENGES OF SCIENTIFIC MODELLING

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<https://github.com/Jnsll/ModelisationScientifique>

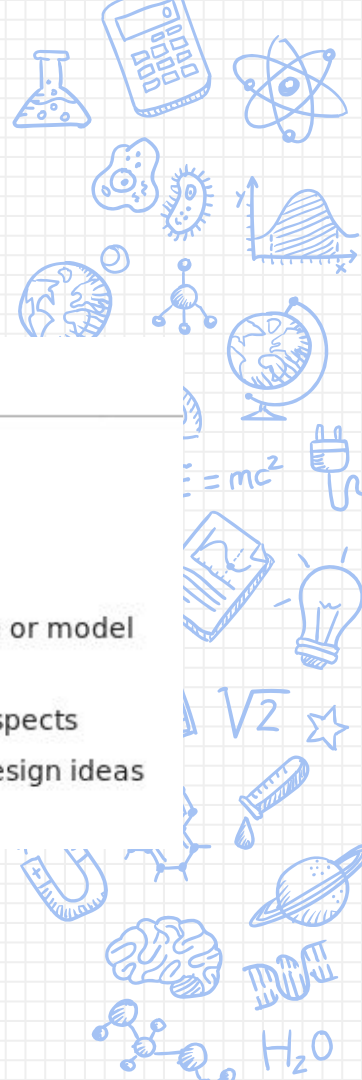




**What does 'modelling' mean ?
What about 'scientific
modelling' ?**

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

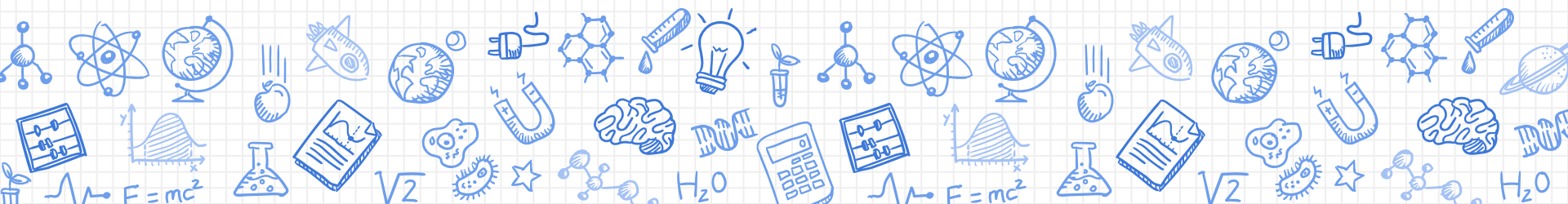




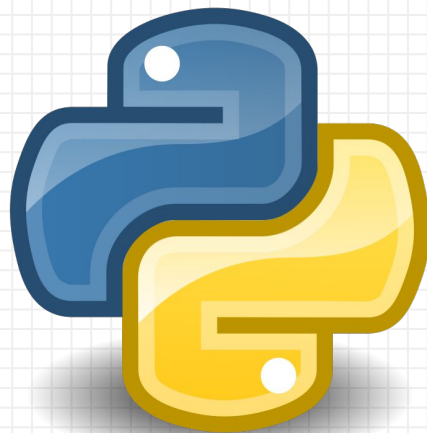
Tools are developed in SE to tackle them

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





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



Most Popular Technologies

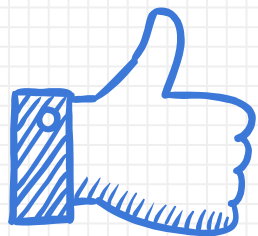
Programming, Scripting, and Markup Languages

All Respondents

Professional Developers



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



THANKS!

Any questions?