



# Workshop Philosophy of Models in Engineering Design

## Intro

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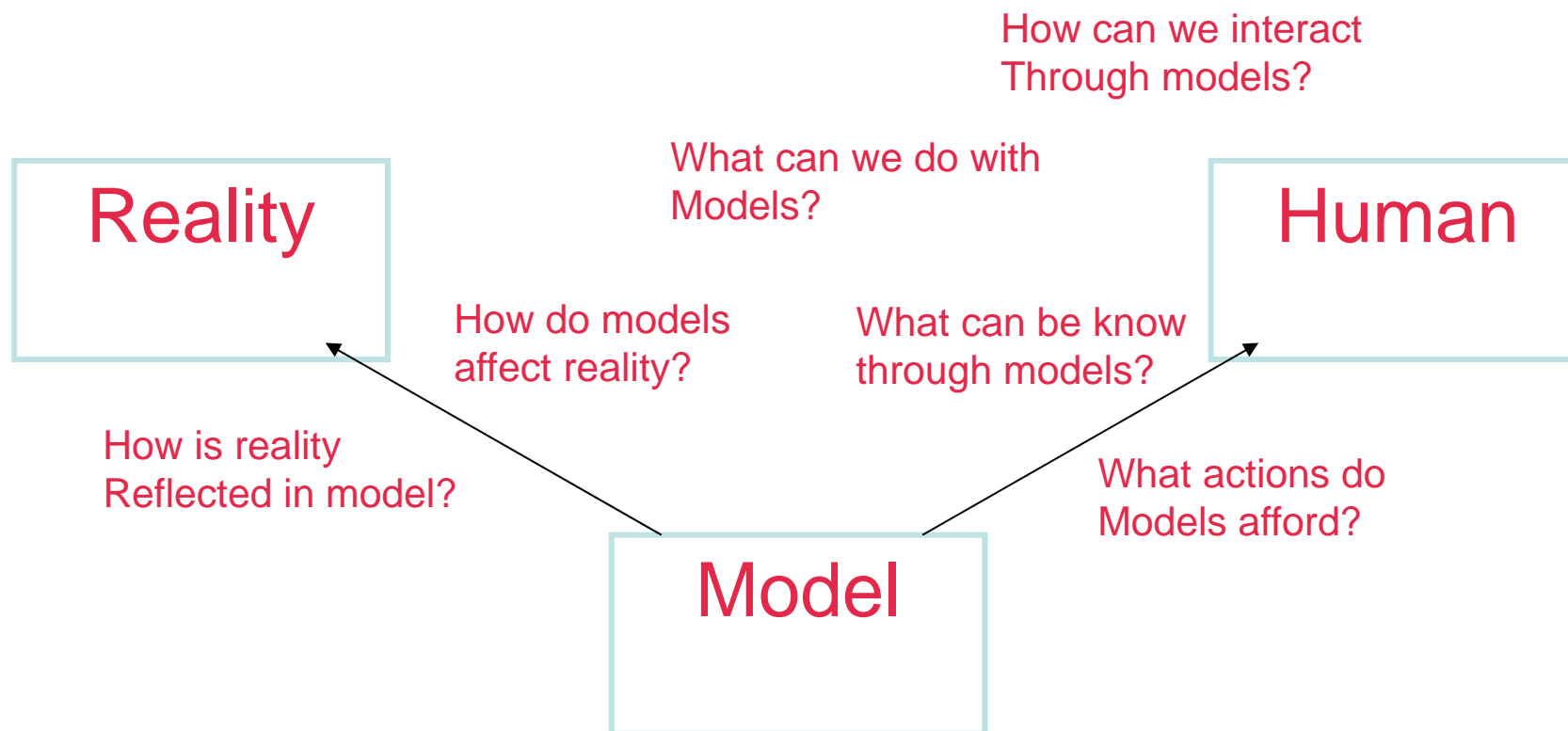


# Motivation for the Workshop

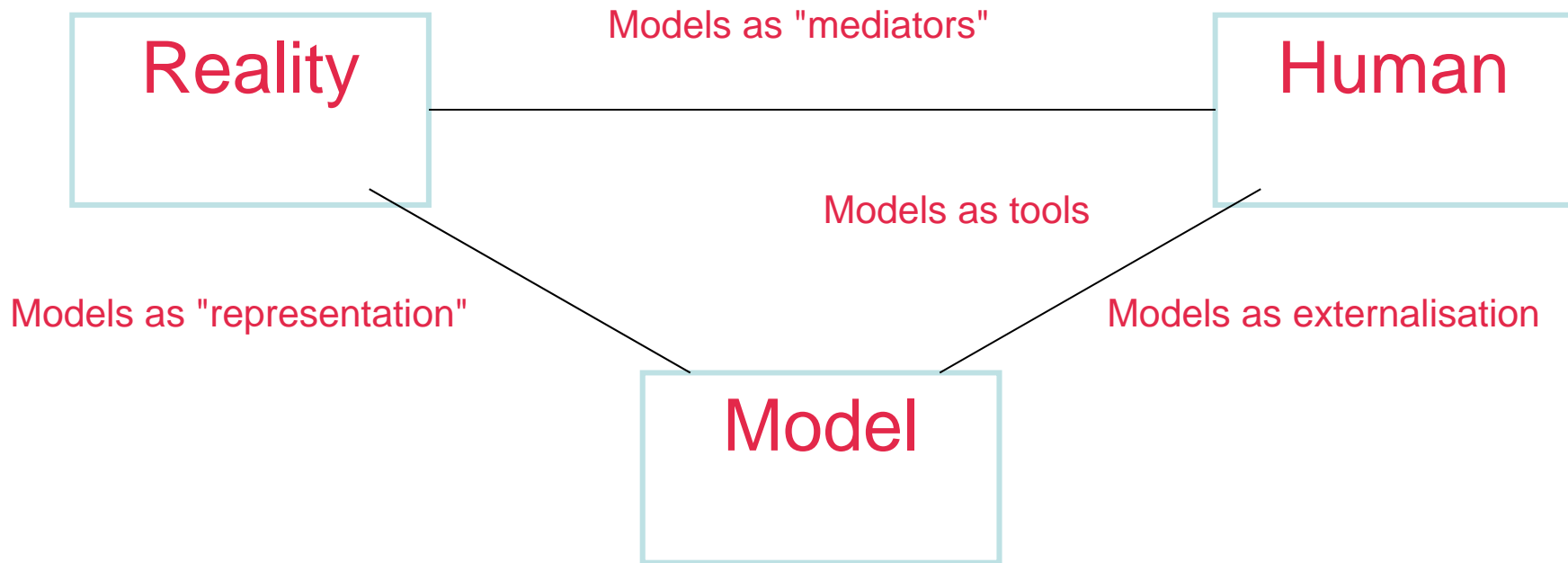
- Engineers use models all the time
- They interact with the products they are designed through models
- They use process models to plan, monitor, control and record their processes
- They have many problems with using models and problems arising from the way they use and think about models
- Some of these problems arise from the abstract properties of models, but engineers rarely think about this

# Research Questions

- Little previous research
- Discovering research questions



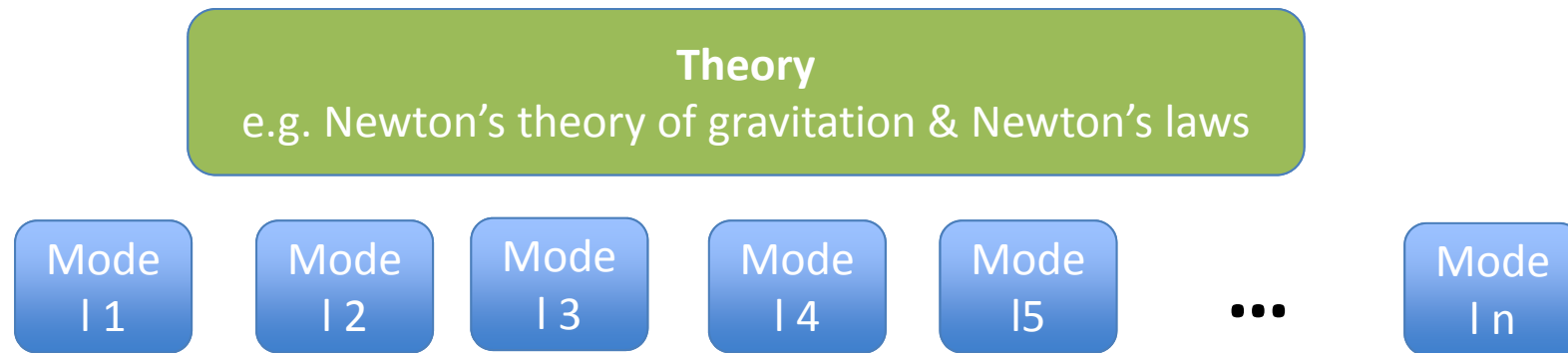
# Notions of models





# Philosophy of Science (PoS) & Models

- For a long time: models put in second place
  - science = theories, laws, ...
- This changed with the so-called **semantic view** on scientific theories
  - Models central epistemic tool, not only heuristic (pedagogical, ...) tools
  - **Theory = Sum of all its models**
  - Notion of model derived from **logic**

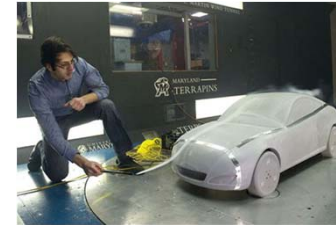


- After the so-called practice turn:
  - Models as used in science

# 1 Concrete physical models



- Animal models in the life sciences,
- Rescaled cars in a wind tunnel, ....

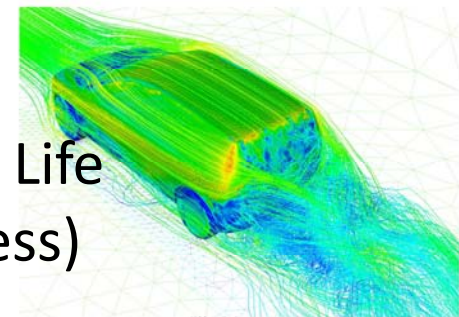


# 2 Mathematical Models

- Bohr's model of the atom,
- k- $\epsilon$ -model of turbulent transport, ....
- Science/Philosophy: "analytic" models/ Design: "analysis" models

# 3 Simulation models

- Focus on process
- Neighbourhood segregation model, Game of Life
- Numerically implemented models (of a process)





How to accommodate for the plurality  
of models?

How can models be central in driving  
scientific progress with all their  
shortcomings?





## Some current trends on models in PoS

- They **represent** a target system
  - Similarity between **target system** and model
- They **mediate** between experiment and theory
  - Models are partially **independent** from both theory and experiment





# THANK YOU

- For being here!
- For financing this workshop
  - ITZ – Institute for Technological Futures, KIT
  - HGF – Helmholtz Research Association
- The people who did all the preparation
  - ITAS staff
    - Elke Träutlein & Muasez Genc
- **Practicalities**
  - Your Choice for the Dinner?!
  - **20-25 minutes** presentation
  - Up to 3 minutes comments by "the other" discipline
  - Introductory round: Who & why