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Joint modelling exercise follow up plans

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Looking beyond general metrics for model comparison – lessons from an international model intercomparison study

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8 research institutes and 11 model structures

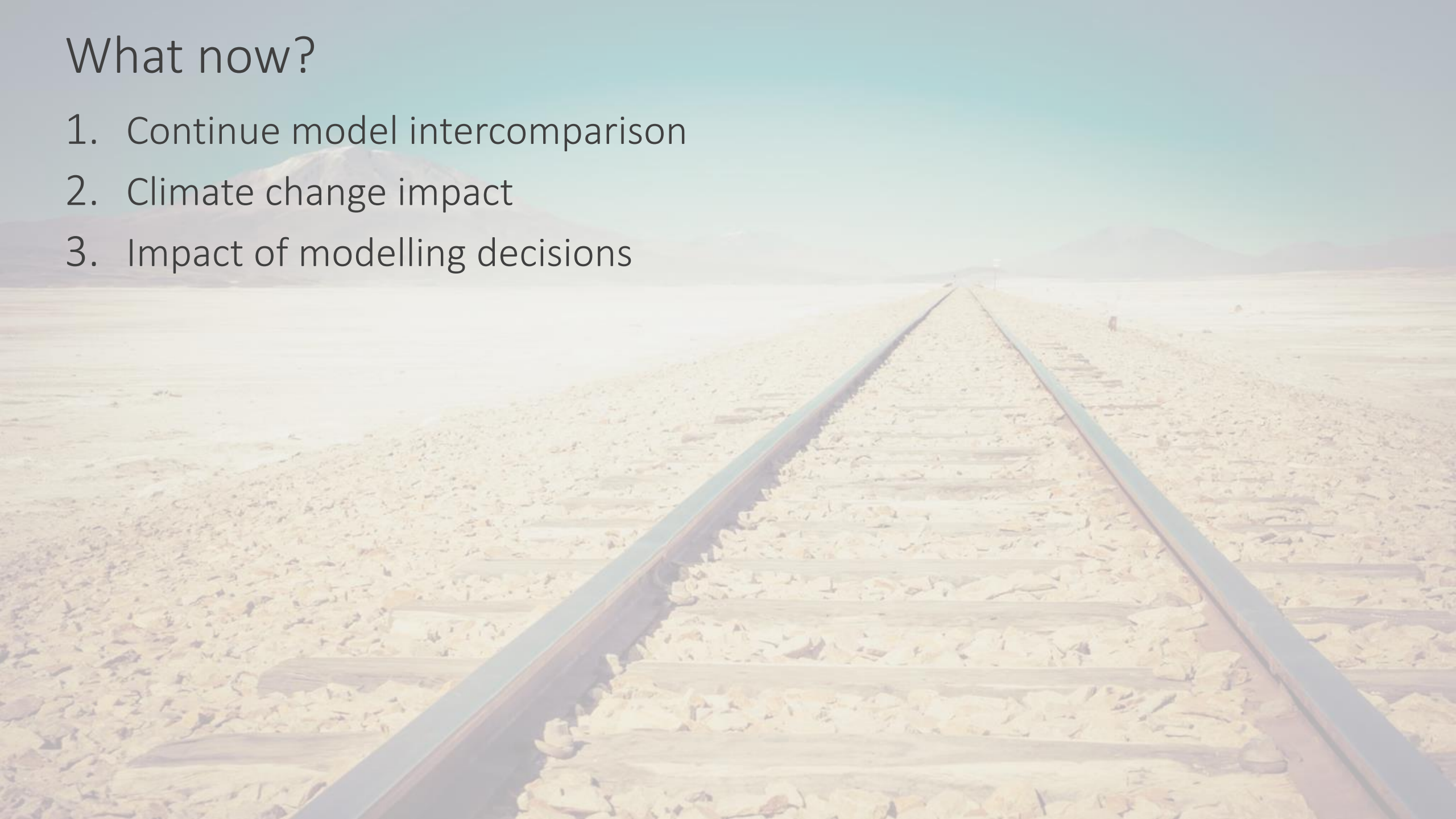
Table 2. Characteristics of the configuration of the different models.

Model	Forcing	Calibration	Parameters[a]	Regionalisation	Group
GR4H	Lumped	Prefiltering of parameter space using three quantiles for each of the four parameters, followed by step-wise calibration to optimum	4	No	IRSTEA
PRESAGES	Lumped	Optimization with 100 starting points within the parameter space that converge to local minima, which results in more than 2000 parameter sets	6	River routing based on catchment area	Université de Lorraine
WALRUS	Lumped	Manual narrowing of parameter space 500 samples with Latin hypercube, 10 best ones for Levenberg–Marquardt optimisation	3	No	Wageningen University and Research
M2	Lumped	MOSCEM-UA (Vrugt et al., 2003)	5	No	Eawag
M3	Lumped	MOSCEM-UA	6	No	Eawag
M4	Lumped	MOSCEM-UA	7	No	Eawag
M5	Lumped	MOSCEM-UA	9	No	Eawag
NAM	Lumped	DREAM_ZS (Laloy and Vrugt, 2012)	12	No	Flanders Hydraulics Research
FLEX-Topo	Semi-distributed	Manual narrowing of parameter space, 2000 uniform samples	20[b]	Percentages HRUs; hydraulic length	Delft University of Technology
VHM	Lumped	MOSCEM-UA	12	No	University of Leuven
wflow_hbv	Distributed	Manual narrowing of parameter space, 2000 uniform samples	9	Interception capacity	Deltares

[a] Number of calibrated parameters; [b] Of the parameters, 11 were linked to other parameters based on parameter constraints (e.g. Gharari et al., 2014)

What now?

1. Continue model intercomparison
2. Climate change impact
3. Impact of modelling decisions



What now?

1. **Continue model intercomparison**
2. Climate change impact
3. Impact of modelling decisions

Intercomparison of hydrological models

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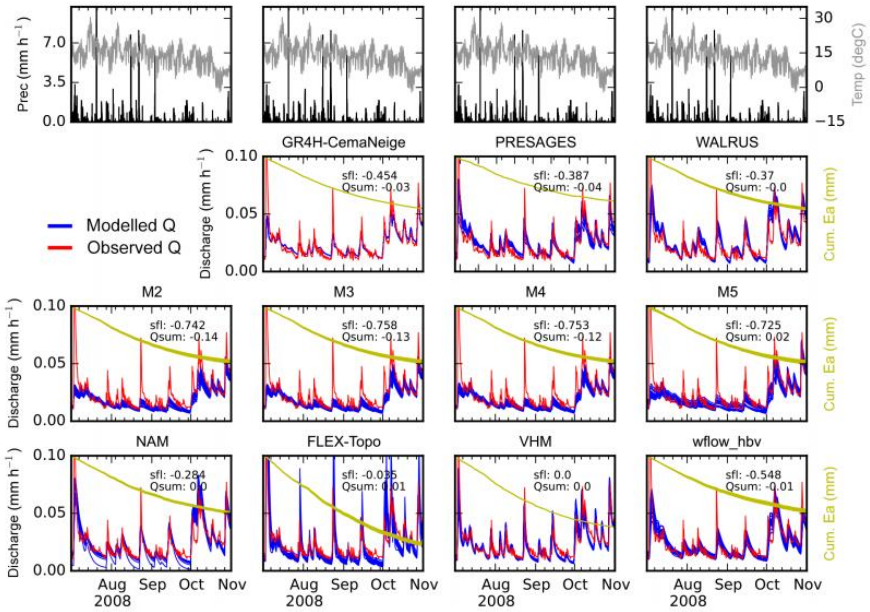
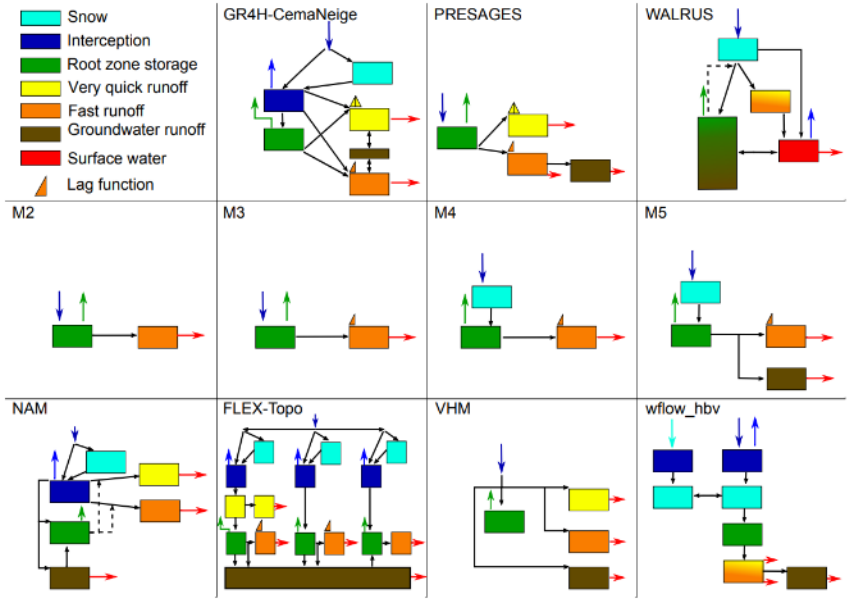
Focus on observed and simulated discharges



Link with model structures



A lot of (almost) already available data remains unanalyzed

- Compare:
  - **States** and **fluxes** between models
  - Soil moisture state with satellite based soil moisture products
  - Total storage with GRACE
  - Partitioning of fast and low flow
  - Long term partitioning in evaporation, deep groundwater losses and runoff

What is needed?

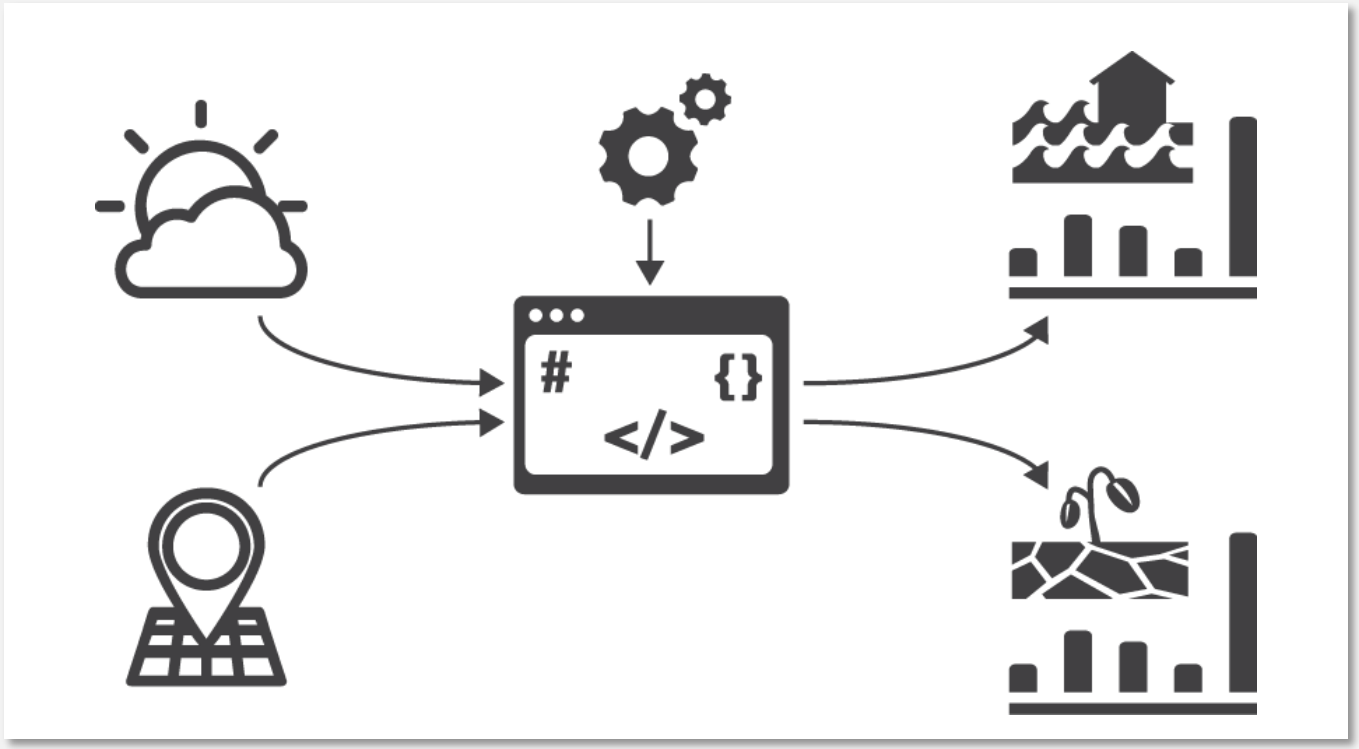
- Run our calibrated model (20 parameter sets) and export all states and fluxes (based on a template)
- Run our calibrated models for period 2016-2017 to assess:
  - Modelled low flow during 2017

- Combine and analyze all results → map the differences in modelled internal processes

What now?

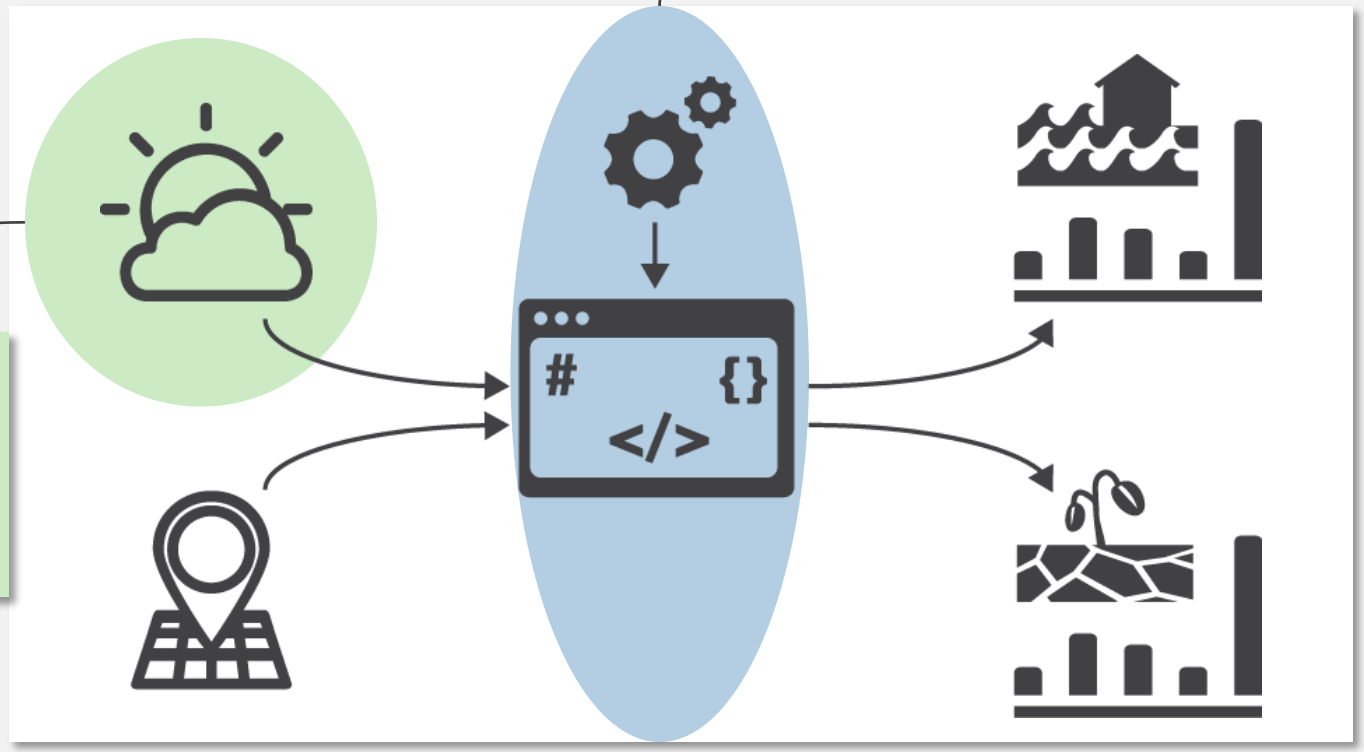
1. Continue model intercomparison
2. **Climate change impact**
3. Impact of modelling decisions

Hydrological modelling



Climate change impact

Model
(1) Structure
(2) Calibration



Input data
(1) Current climate
(2) Future conditions

Climate change impact: what do we need?

- Calibrated hydrological models
  - OK. From previous study, 11 models with 20 parameter sets each.

- Time series for future climate conditions (P and ETo)
  - Different methods (Belgium, France, Germany, the Netherlands, Switzerland, …)?

- Run all models for all future conditions

- Export total flow

What now?

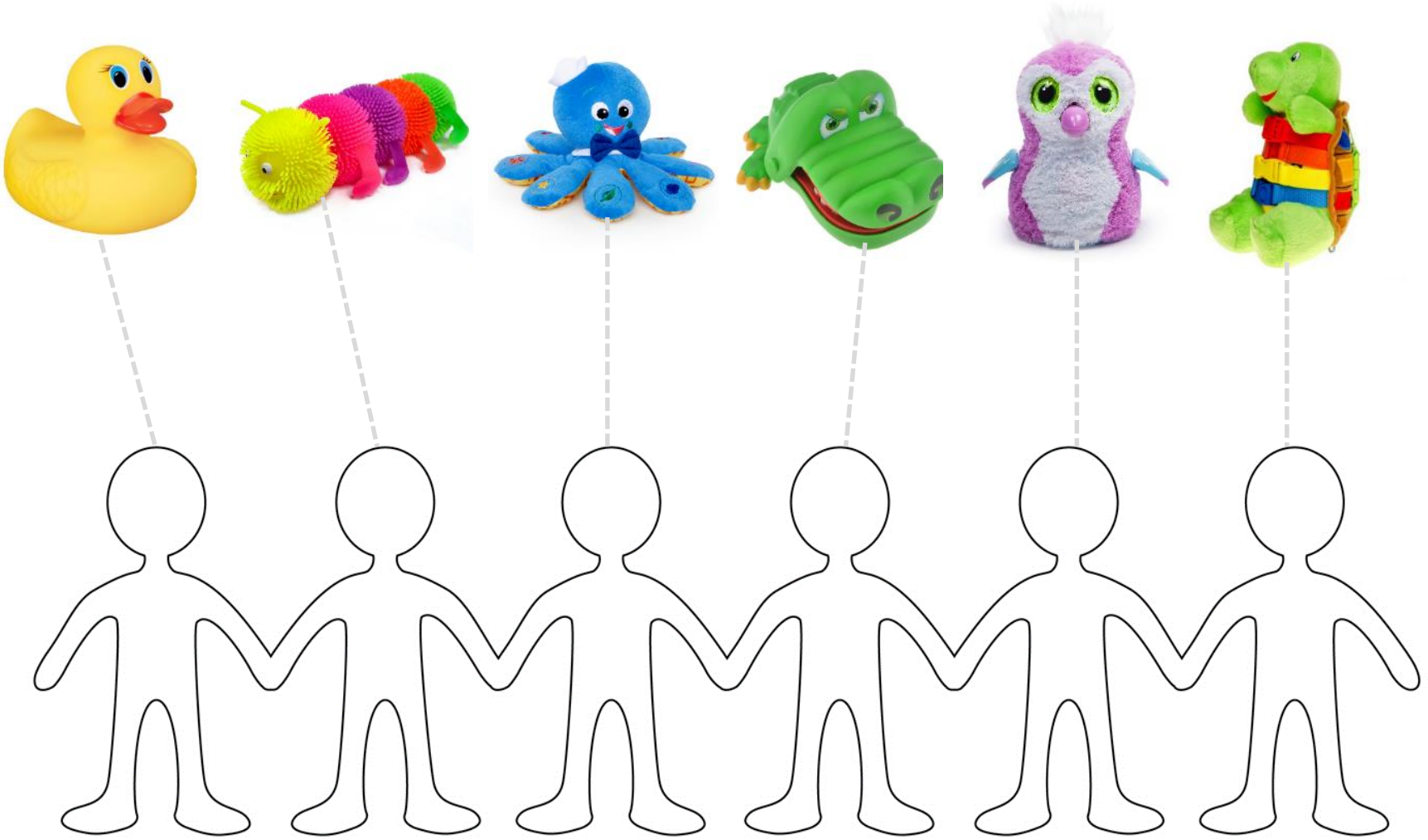
1. Continue model intercomparison
2. Climate change impact
3. **Impact of modelling decisions**

Proposal Model intercomparison study

Lieke Melsen

Research question:
What's the influence of the modeller on the model results?

Rationale:
Subjective modelling decisions influence model results.
Experience with a specific model can influence the modelling decisions.



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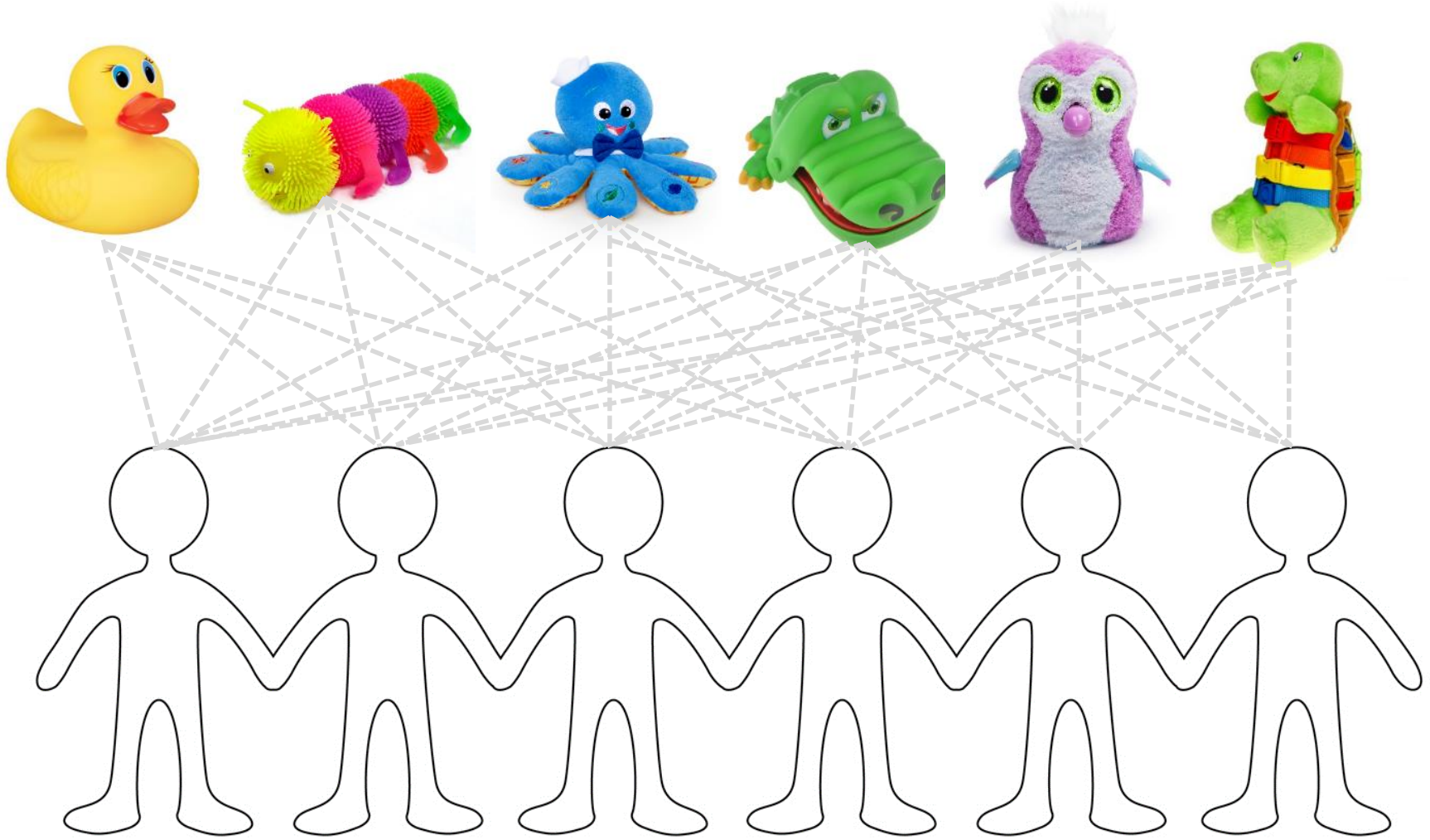

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Proposal Model intercomparison study

Method:

A protocol describes input data, output variables to evaluate (start with Q only?), and calibration data (or even: calibration-strategy?). All modellers run all models.

Proposal Model intercomparison study

H0:
The model performance is independent from the modeller who ran the model

H1:
The model performance differs when the same model is run by different modellers. The model performance is not related to the experience of the modeller with that model.

H2:
The model performance differs when the same model is run by different modellers. The model performance is related to the experience of the modeller with that model.

Discussion
Questions
Ideas
…

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