

Validation of models used for scenario generation

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Scenarios Forum

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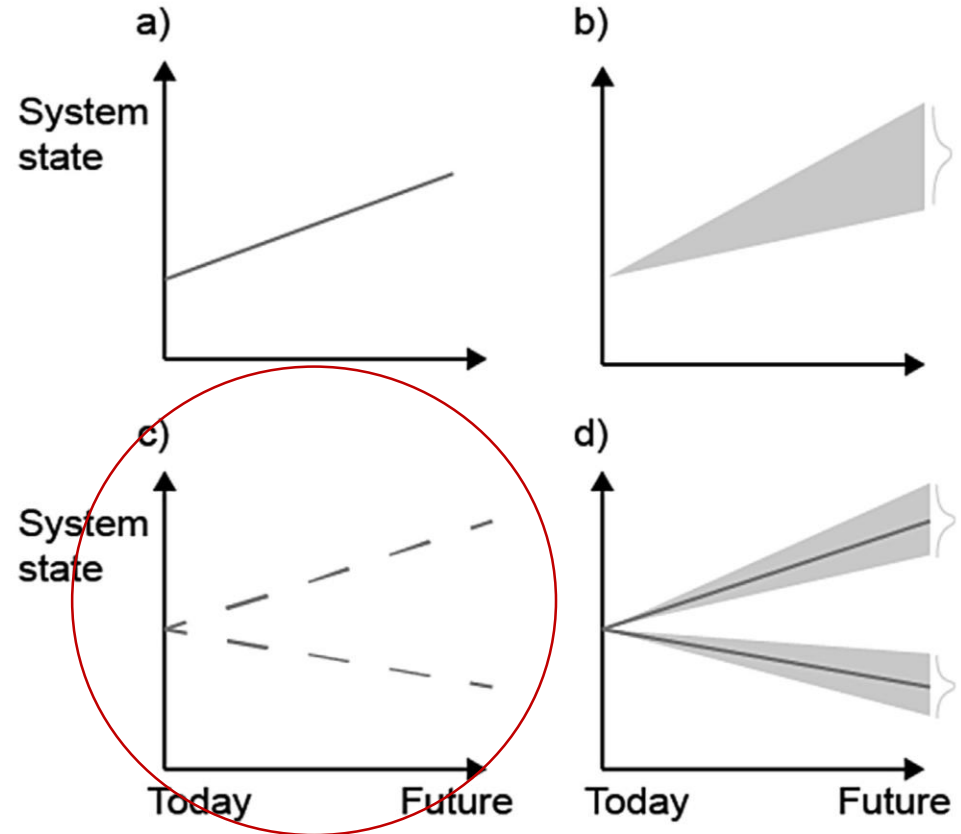
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Model “Validation”

- whether model predictions are consistent with observational data, or the model is an accurate representation of physical reality
- ‘establishing confidence in the model by judging its usefulness with respect to some purpose’

Three complementary paradigms

Maier et al., 2016. An uncertain future, deep uncertainty, scenarios, robustness and adaptation: How do they fit together? *Environmental Modelling & Software* 81 154-164.



Practice and Perspectives

What are the existing validation viewpoints, **in a general** modeling context?

What are the existing validation viewpoints, when models are used for **scenario exploration**?

- Bibliometric and text-mining analysis of the academic literature
- Online survey

Eker S, Rovenskaya E, Obersteiner M, Langan S. 2018. Practice and perspectives in the validation of resource management models. *Nature Communications* 9(1) 5359.

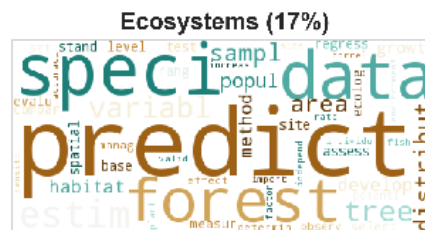
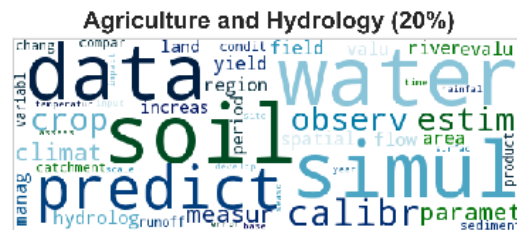
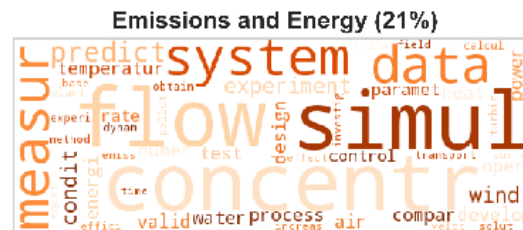
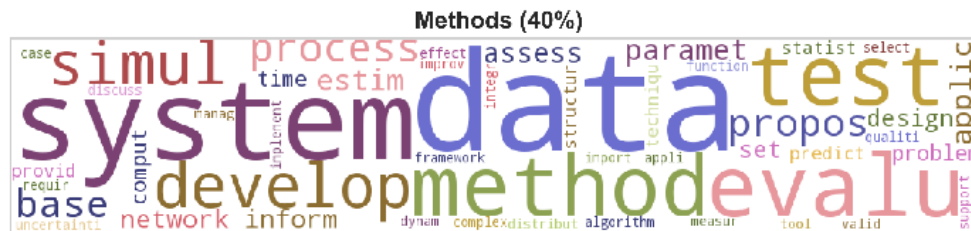
Eker S, Rovenskaya E, Langan S, Obersteiner M. (under review) A bibliometric analysis of the model validation literature.

Literature

Search field	Search criteria
Any of the title, abstract or keywords include	"model validation" OR "model validity" OR "model evaluation" OR "model assessment" OR "model testing"
Language	only English
Predefined Scopus fields	Environmental science Computer science Agricultural and biological sciences Mathematics Energy Social sciences Economics, econometrics and finance Decision sciences Multidisciplinary

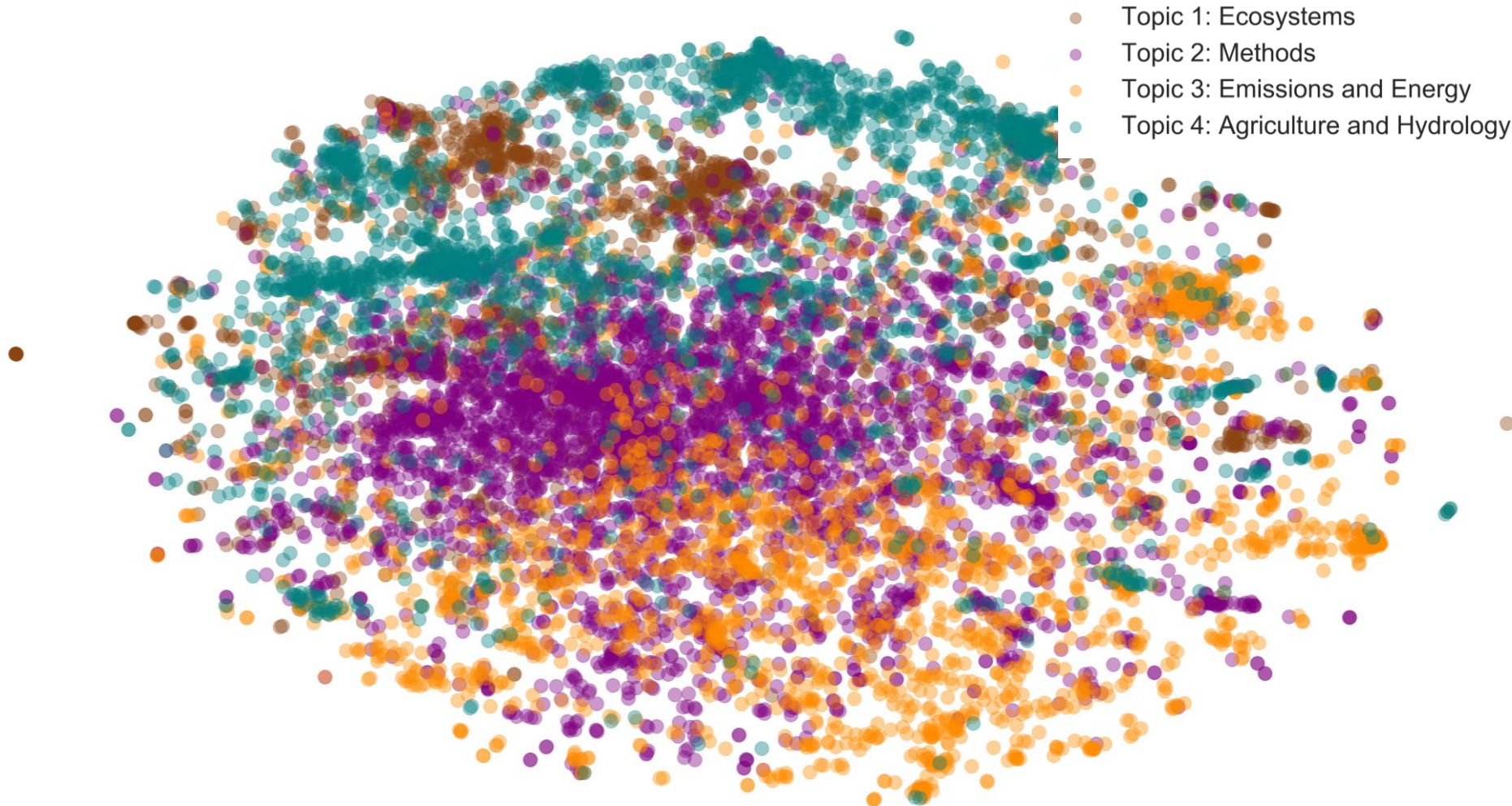
Viewpoints in the literature

Four main topics in the model validation articles



Visualizing the publication dataset

Map of Model Validation Publications and Their Topics





Prediction-orientated modelling and a strong emphasis on empirical data, aligning with the representativeness viewpoint.



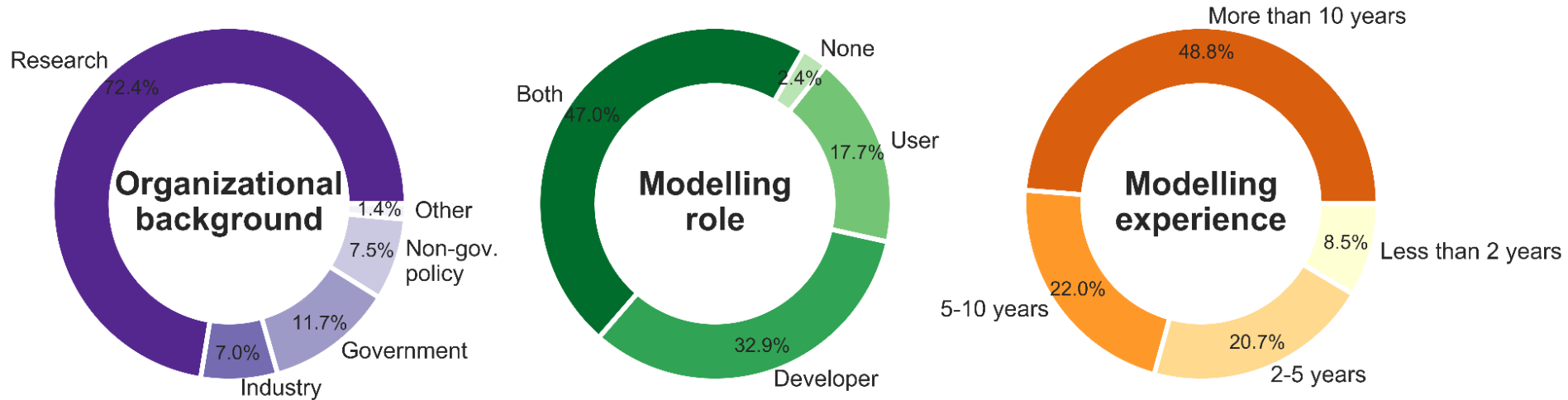
Such approaches seem prevalent also in the studies that involve scenario analyses, while uncertainty is scarcely mentioned.



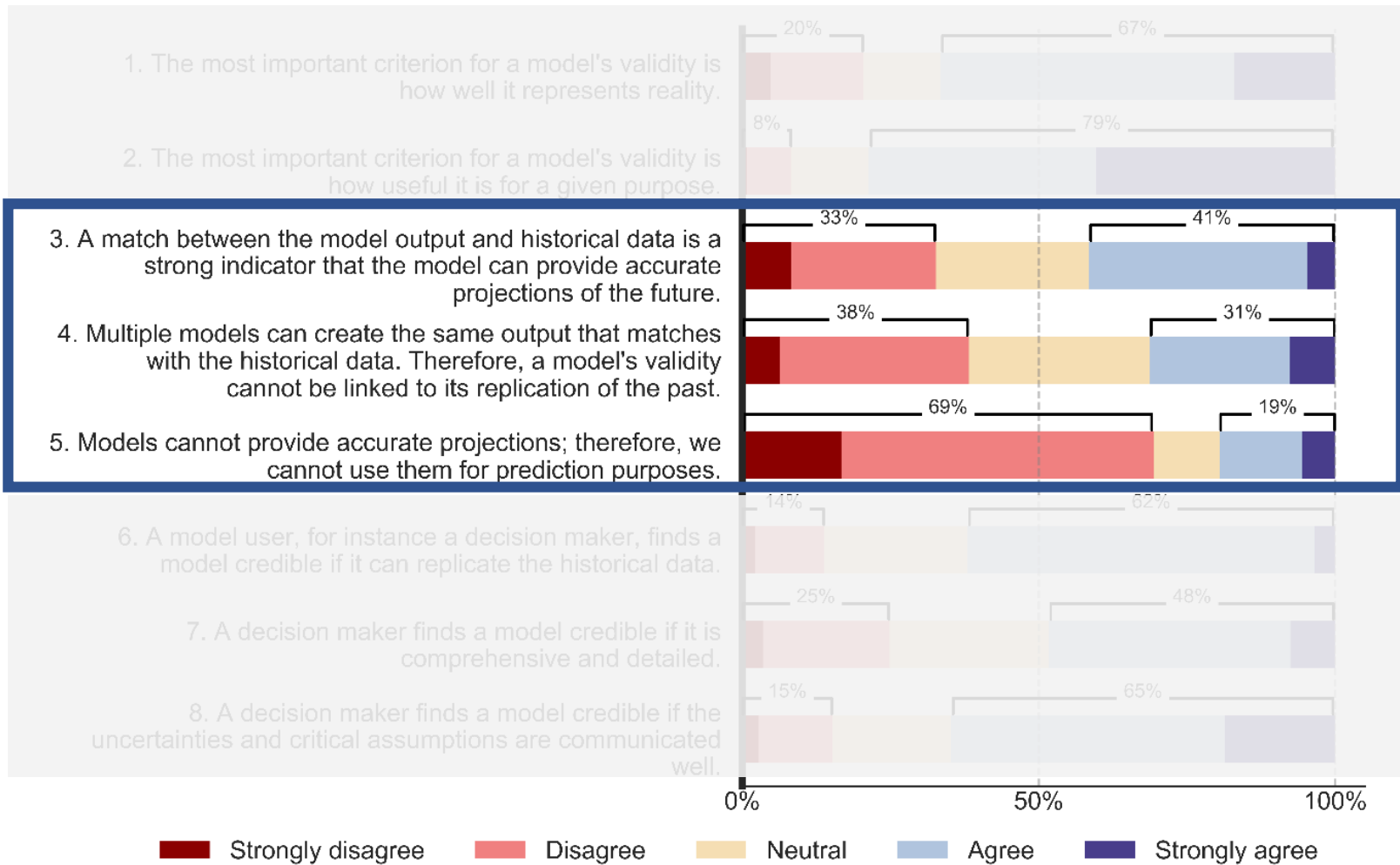
Different modeling fields seem to be closed to each other's validation practice, based on citation analysis.

Viewpoints of practitioners

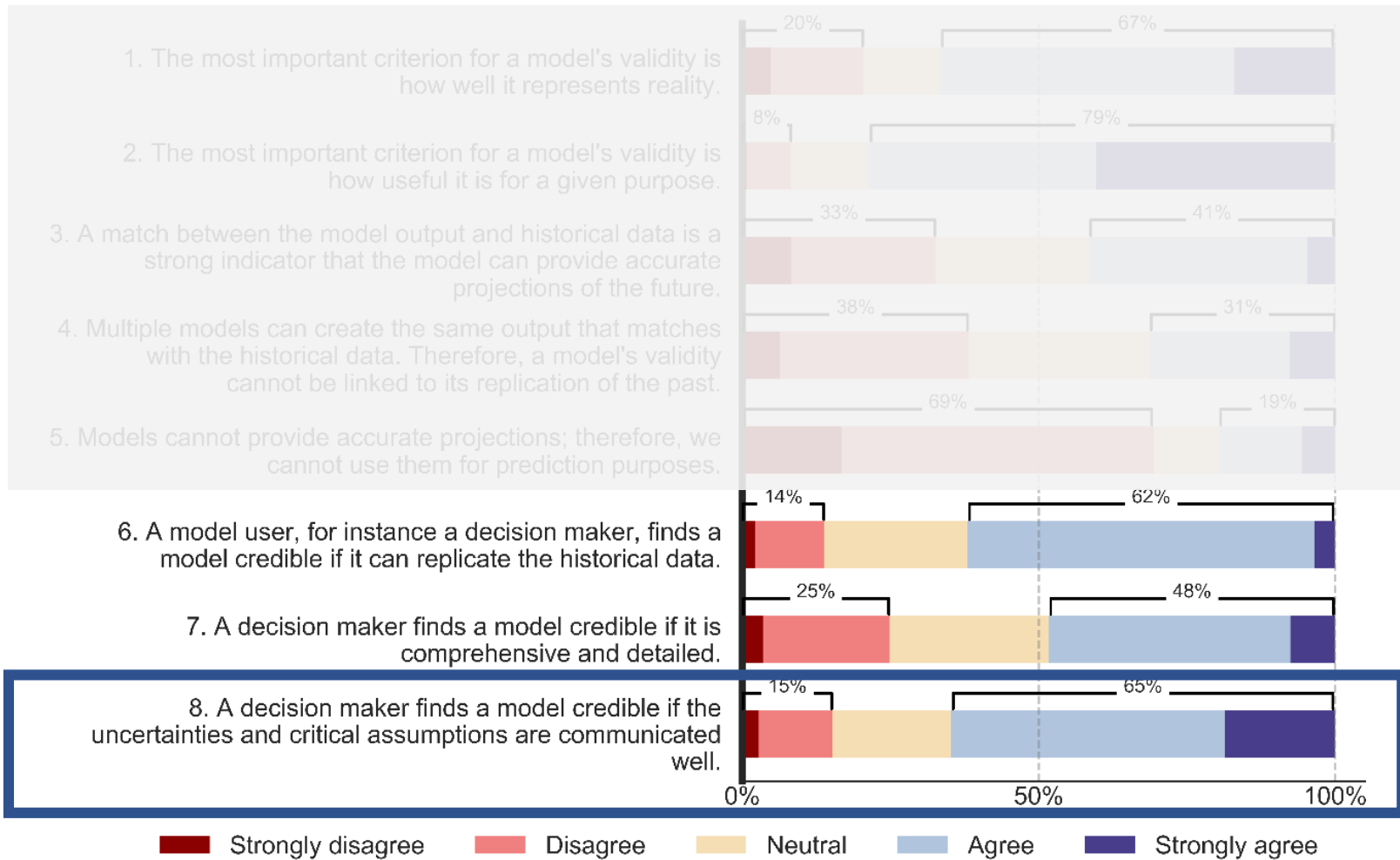
Backgrounds of the survey respondents



Viewpoints of practitioners

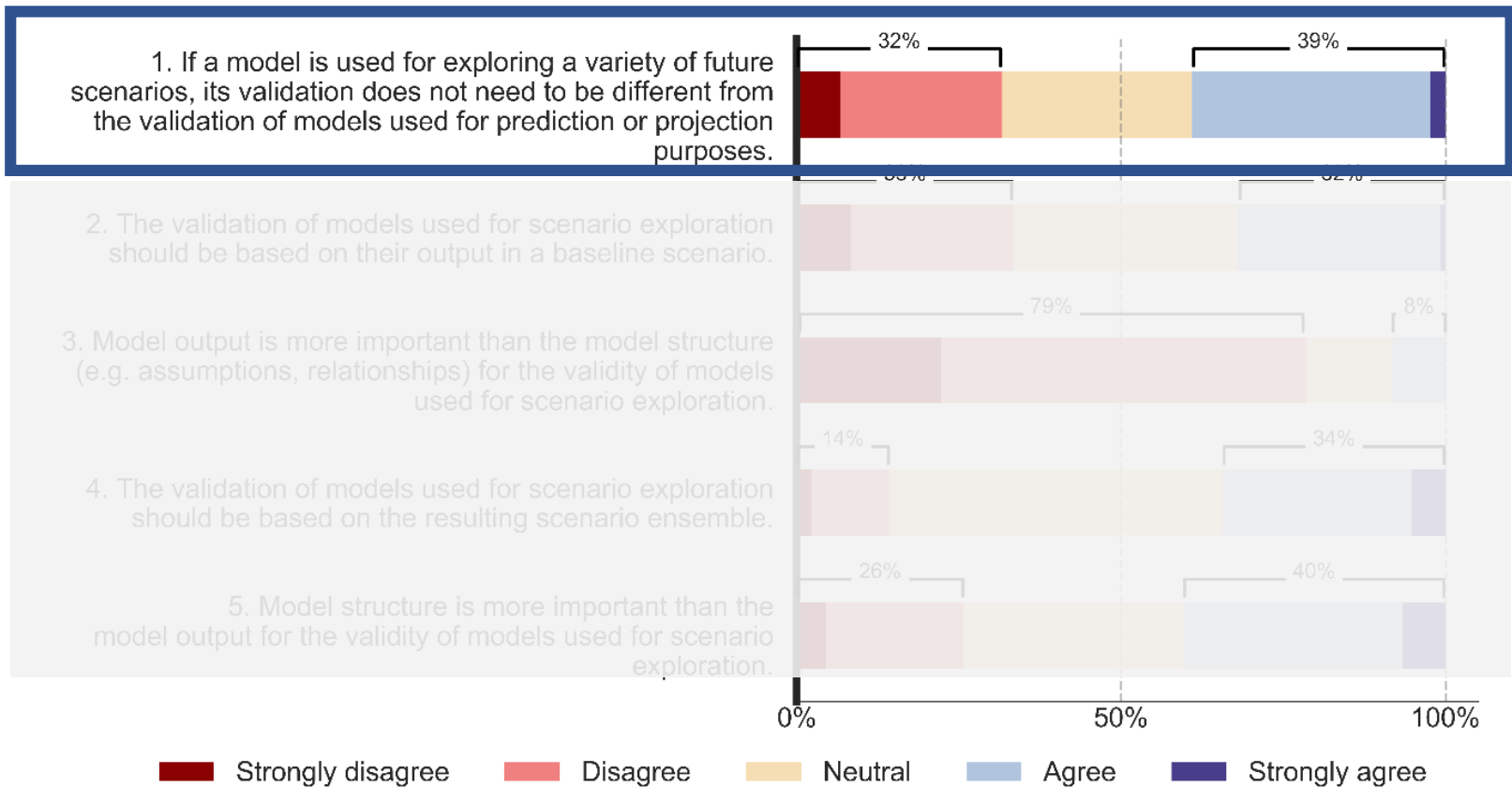


Viewpoints of practitioners



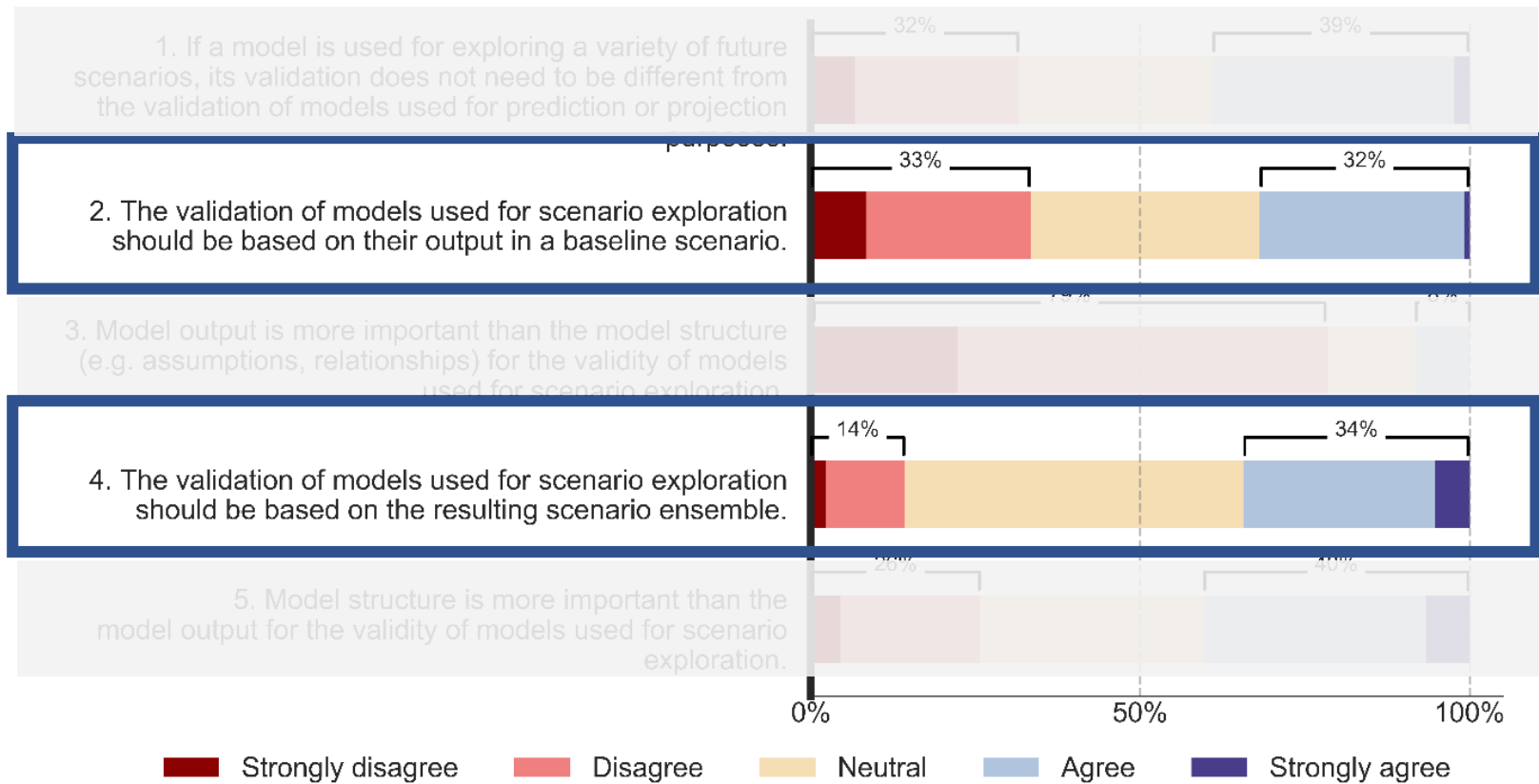
Viewpoints of practitioners

Scenario studies



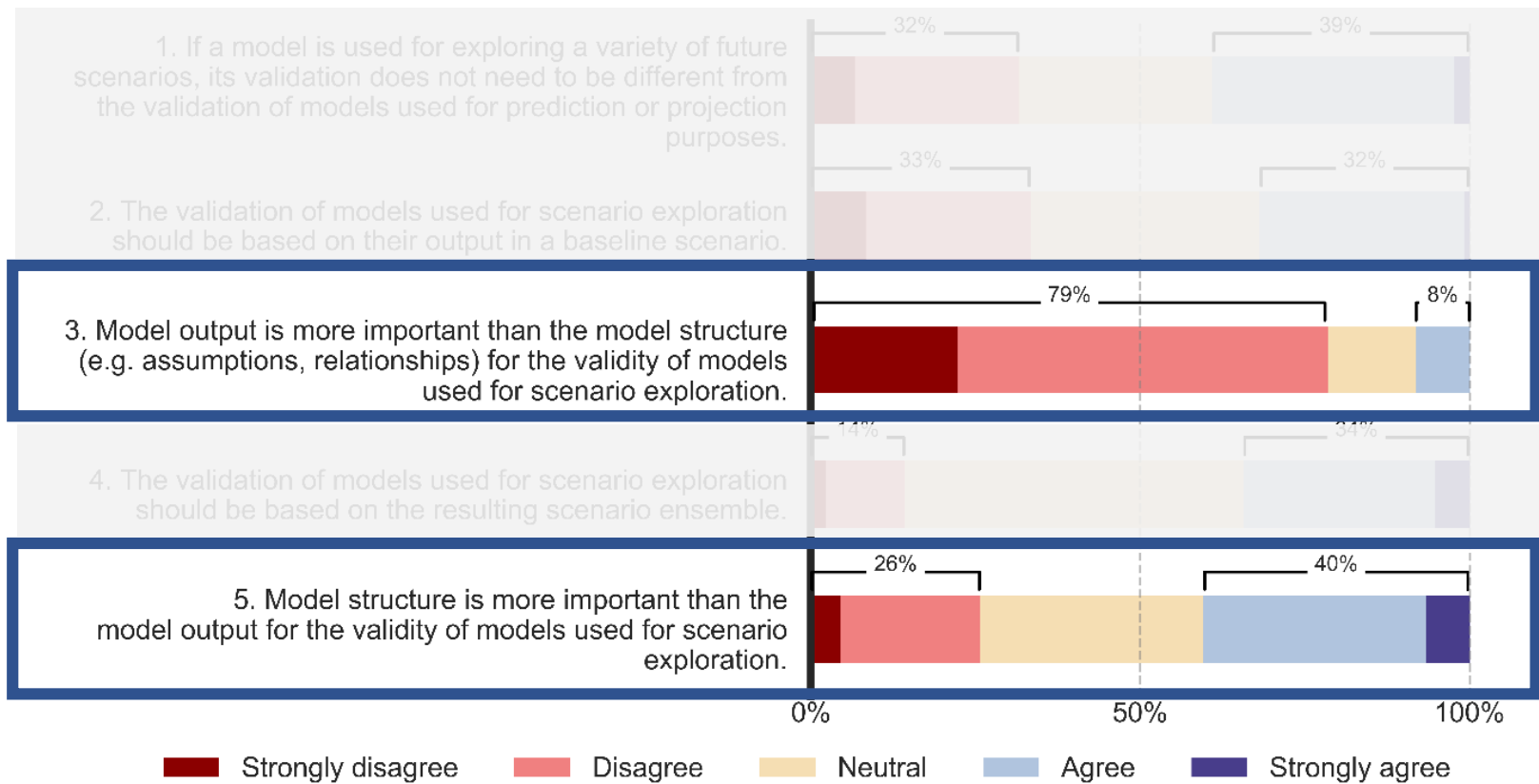
Viewpoints of practitioners

Scenario studies

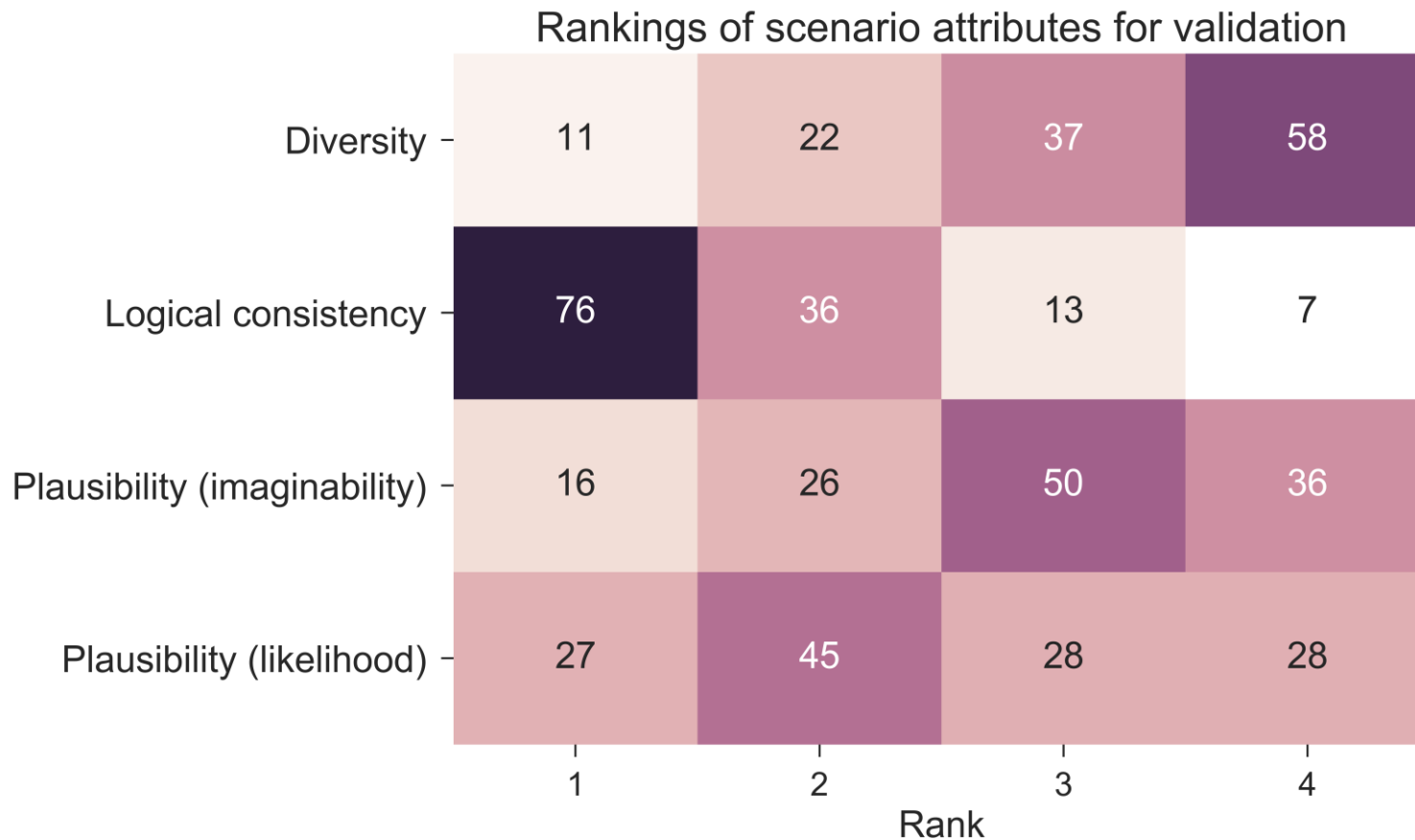


Viewpoints of practitioners

Scenario studies



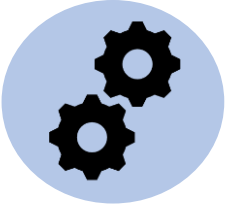
Which scenario attributes are important?



Conclusions



Multiple plausible futures paradigm can be considered a **niche**.



Model **structure** is more important than the output for the validation of models used for scenario generation.



Diversity is an important scenario attribute that needs to be included in model evaluation

Guivarch et al. 2016.

Carlsen et al. 2016.

Eker and Kwakkel, 2018.

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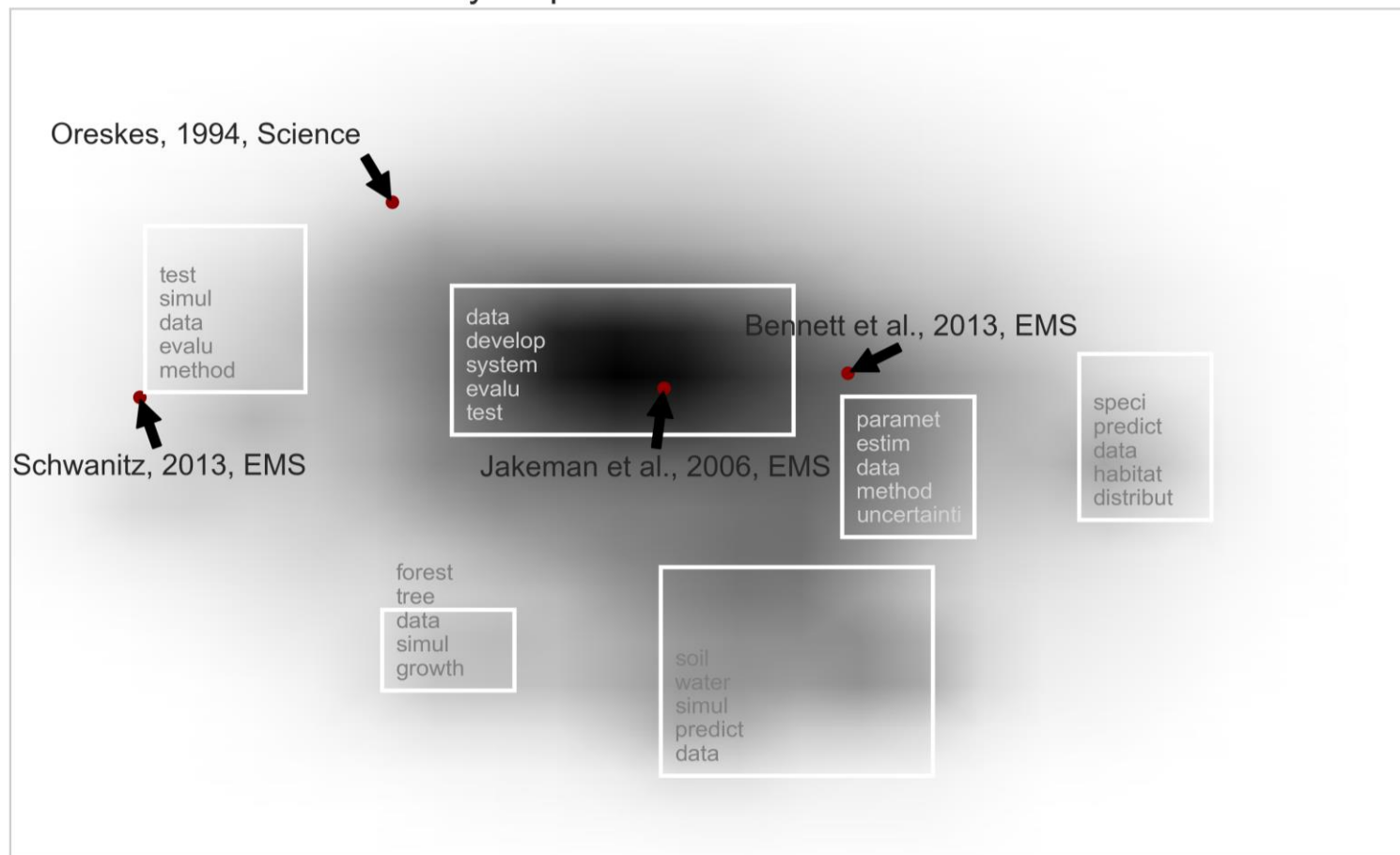
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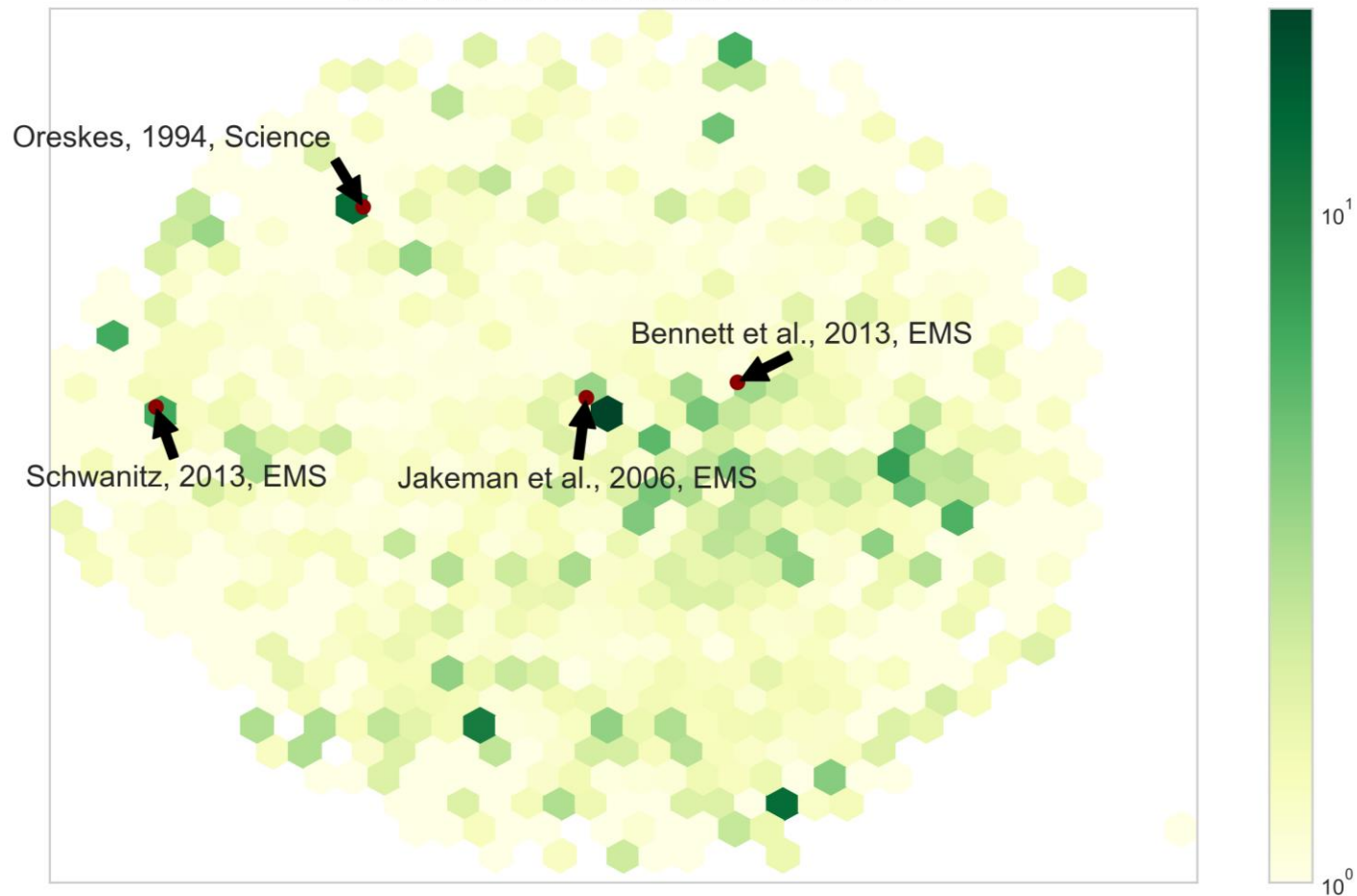
Visualizing the publication dataset

A density map of the model validation articles

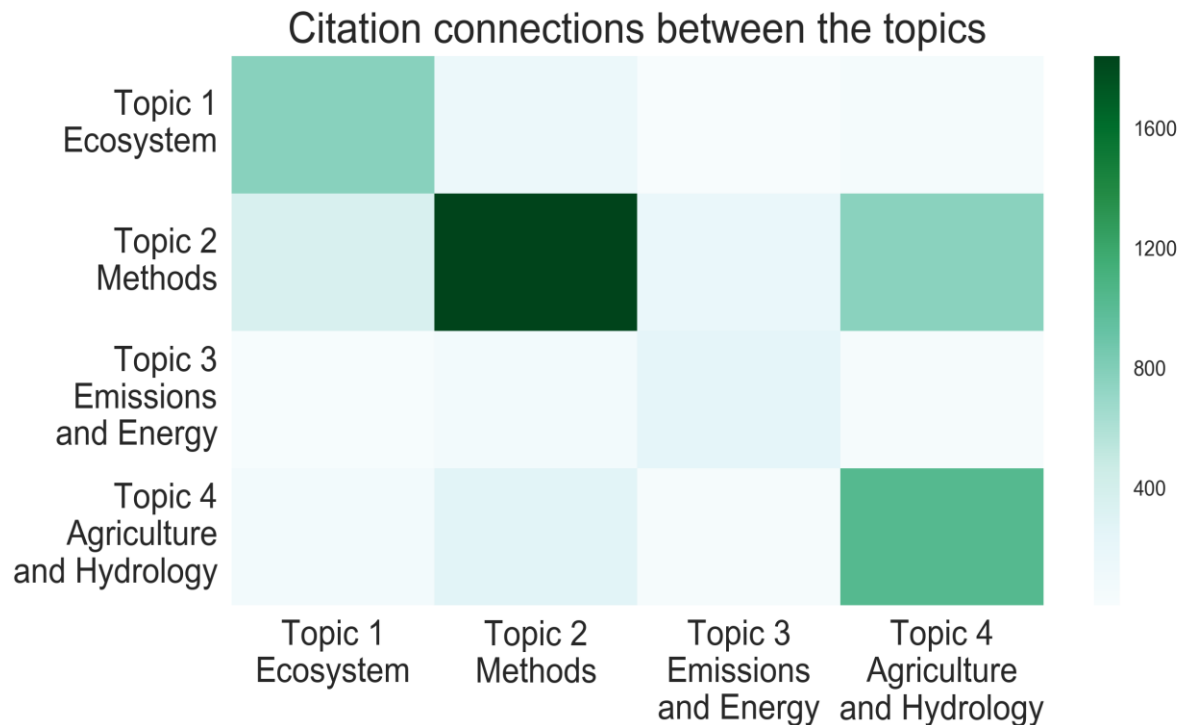


Citation scores

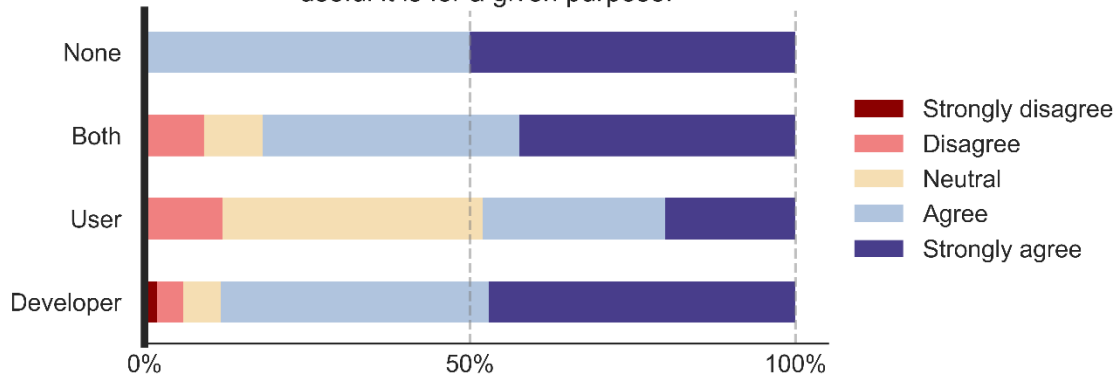
Map of Model Validation Publications and Their Citation within the Dataset



Viewpoints in the literature



The most important criterion for a model's validity is how useful it is for a given purpose.



A decision maker finds a model credible if the uncertainties and critical assumptions are communicated well.

