

# A light-hearted approach to a serious problem: Building “informed trust” in models

**Kate R. O'Brien**<sup>a</sup> , **Matthew P. Adams**<sup>a,b</sup> , **Felix Egger**<sup>a,c</sup> , **Paul Maxwell**<sup>a,c</sup>, **Tony Weber**<sup>c</sup>,  
**Holger R. Maier**<sup>d</sup> , **Maria P. Vilas**<sup>e</sup> , **Melanie Shaw**<sup>e</sup>, **Ryan Turner**<sup>f,g</sup> , **Greg Birkett**<sup>a</sup>,  
**David P. Hamilton**<sup>h</sup>, **Hayley Langsdorf**<sup>i</sup> and **Mark E. Baird**<sup>j</sup>

<sup>a</sup> School of Chemical Engineering, University of Queensland, St Lucia, Australia

<sup>b</sup> School of Mathematical Sciences and Centre for Data Science, Queensland University of Technology, Brisbane, Australia

<sup>c</sup> Alluvium Consulting Australia, Fortitude Valley, Queensland, Australia

<sup>d</sup> School of Civil, Environmental and Mining Engineering, The University of Adelaide, Australia

<sup>e</sup> Queensland Government Department of Resources, Dutton Park, Australia

<sup>f</sup> Reef Catchments Science Partnership, University of Queensland, St Lucia, Australia

<sup>g</sup> Water Quality and Investigations, Queensland Government Department of Environment and Science, Brisbane, Queensland, Australia

<sup>h</sup> Australian Rivers Institute and School of Environment and Science, Griffith University, Brisbane, Australia

<sup>i</sup> Thoughts Drawn Out Pty Ltd, Anthony, Queensland, Australia

<sup>j</sup> CSIRO Environment, Hobart, Australia

Email: k.obrien@uq.edu.au

**Abstract:** Building, running and interpreting models is the core business of modellers. But it's not the full story: models are not an end in their own right, but tools to provide insight and understanding, and to support decision-making by people from a variety of backgrounds. Furthermore, few modelling application can be undertaken without the input of non-modellers, either directly (via the provision of funding, data and specialist knowledge of the system being modelled and the questions driving the study) or indirectly (via use of existing data and published information).

Therefore, in order to build the best models, and get the most value from modelling projects, modellers need to engage effectively with those who fund models, and those who apply or are affected by model outputs. At the heart of this engagement lies trust. If people don't have sufficient trust in the models, the modellers or design of the project, they may be reluctant to support the modelling endeavour or use the results. Alternatively, if people trust the models too much, the models or model results may be applied inappropriately.

How to find the balance between trusting models enough, but not too much? We propose that “educated trust” in models is built through investing in relationships with relevant parties over the life cycle of modelling projects. Building these kind of relationships takes time, money and skill, which needs to be factored into project budgets. Here we present a variety of resources and approaches to support modellers in building “educated trust” in models, through engaging with key stakeholders in a way which encourages understanding of how the model/s work. We present a light-hearted video to demonstrate how relationship-building can overcome common conflicts (O'Brien et al. 2022); a framework for characterizing and resolving model-data discrepancies (Vilas et al. 2023 in press); and guidelines on engagement approaches which build, and conversely kill, trust in models. We encourage modellers to identify whose trust they require for the modelling enterprise to be successful, and identify what resources are required for successful engagement. In particular, we recommend that modellers identify structural barriers to building trust: are there incentives for key players not to trust, or to over-trust, the model, and how can those barriers be addressed? Is there an historical context which encourages distrust in models?

## REFERENCES

- O'Brien, K., M. Vilas, M. P. Adams, F. Egger, P. Maxwell, A. O'Neill, and H. Langsdorf. 2022. “The marriage of data and models”: a light-hearted animation with a serious purpose, <https://doi.org/10.6084/m9.figshare.21129634.v1>
- Vilas, M. P., F. Egger, M. P. Adams, H. Maier, B. Robson, J. Ferrer Mestres, L. Stewart, P. Maxwell, and O. B. K. R. 2023 TALKS: a systematic framework for resolving model-data discrepancies. *Environmental Modelling & Software*. 163: 105668: <https://doi.org/10.1016/j.envsoft.2023.105668>

**Keywords:** *Models, trust, engagement, communication, conflict*