

# Odin-Monty 2025 Workshop Report

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Held on 24–25 March 2025

School of Public Health, White City Campus, Imperial College London

This report summarises the activities, discussions, and feedback collected during the Odin-Monty workshop.



## Executive Summary

The two-day Odin-Monty Workshop (24–25 March 2025, Imperial College London) brought together 75 participants from across academia, public health agencies, and international institutions to build capacity and community around the odin, dust, and monty packages. The programme included hands-on sessions, invited case studies, a drop-in technical clinic, and a lightning talk session open to online attendees - where 23 joined virtually, including one speaker from Brazil.

Travel grants were offered to support a diverse and inclusive group of attendees. Participants represented 11 countries and 18 institutions including universities (Imperial, LSHTM, Cambridge, Oxford, Glasgow, Galway, Charité, Umeå), public health bodies (UKHSA, WHO, RIVM), and international research centres (Pasteur, EBI, Barcelona Supercomputing Centre). This diversity significantly enriched the discussions and perspectives shared.

To support continued learning, a public online book was launched detailing the use of odin-monty for modelling and inference.

Workshop site: <https://mrc-ide.github.io/odin-monty-workshop-2025/>  
Online odin-monty book: <https://mrc-ide.github.io/odin-monty/>

## Workshop Agenda

The workshop covered topics across modelling, inference, tool development, and community building. Some social events were also scheduled with a conference reception and dinner. Full agenda available at:

 <https://mrc-ide.github.io/odin-monty-workshop-2025/agenda.html>

## Session Highlights

- Hands-on modelling sessions introduced participants to the odin DSL and walked through debugging workflows.
- A toolchain overview explained how odin, dust, and monty interconnect for model definition, simulation, and inference.
- Case studies demonstrated real-world applications across infectious disease contexts, highlighting performance and flexibility.
- A dedicated session on teaching explored how odin and wodin can reduce barriers to entry in modelling education and outreach.
- Community discussions showcased how researchers adapt the tools in diverse settings, including public health and academia.
- The drop-in clinic provided valuable one-on-one technical support and informal discussions with the core development team. While it coincided with networking and lunch breaks, future sessions could be scheduled more strategically to maximise participation and engagement.
- A lightning talk session—open to online attendees—featured short presentations on work in progress and new ideas.

Materials from the sessions are available at:

 <https://mrc-ide.github.io/odin-monty-workshop-2025/agenda.html>

Lightning talks:

 <https://mrc-ide.github.io/odin-monty-workshop-2025/talks.html>





**Participant Feedback**





Feedback was collected from a diverse group of participants, including experienced users, newcomers, and those familiar with other modelling frameworks. Input was gathered through a combination of small-group roundtable discussions, interactive online tools, and individual written submissions. Engagement throughout was enthusiastic and thoughtful, with many participants offering detailed suggestions. The following themes emerged consistently across multiple groups:

### **Interface Design:**

- Experienced users requested better support for transpilation from odin to base R code and more transparency on internal tokenisation, to allow for extensions or custom tooling.
- Several novice users found the ordering of model elements (e.g., defining parameters after equations) unintuitive and requested clearer sequencing and more inline commenting in examples.
- There were suggestions for improvements to function naming (e.g., renaming 'zero\_every' to 'frequency') and user-accessible verbosity toggles.

### **Documentation & Learning Materials:**

- Novice users highlighted the need for detailed, line-by-line explanations of code and appreciated hands-on workshops and lightning talks from peers.
- Both new and experienced users requested searchable model galleries, videos, and offline documentation, including an FAQ and “how-to”/puzzle-based tutorials.
- There was support for adopting a layered documentation strategy (e.g., Diátaxis framework) to better guide different types of learners.
- Some users noted the value of including mathematical notation alongside code in

examples to bridge conceptual and practical understanding.

### **Work Practice:**

- Across all experience levels, there was strong demand for multinomial draw support, with this feature mentioned emphatically and repeatedly.
- Participants highlighted challenges in iteratively developing and testing model variants, suggesting need for meta-programming support or macros.
- Users noted limitations in reusing compiled models, handling wide vs long-format input data, and performing counterfactual simulations using multistage parameters.
- Some experienced users requested improved diagnostics, warm-up algorithms, marginalisation support, and flexibility for non-inference applications.

### **Community & Ecosystem:**

- There was broad agreement on the need for public forums (e.g., Discourse, Stack Overflow-style), as well as curated libraries of user-submitted models.
- New users in particular felt disoriented navigating documentation and requested better onboarding and example-led learning paths.
- Experienced contributors noted the absence of clear contribution guidelines, including for extending the DSL (e.g., adding new distributions).
- Several users called for better visibility on how odin/monty compares with other modelling and inference frameworks, to help orient newcomers.

### **Additional Noted Discussions and Observations:**

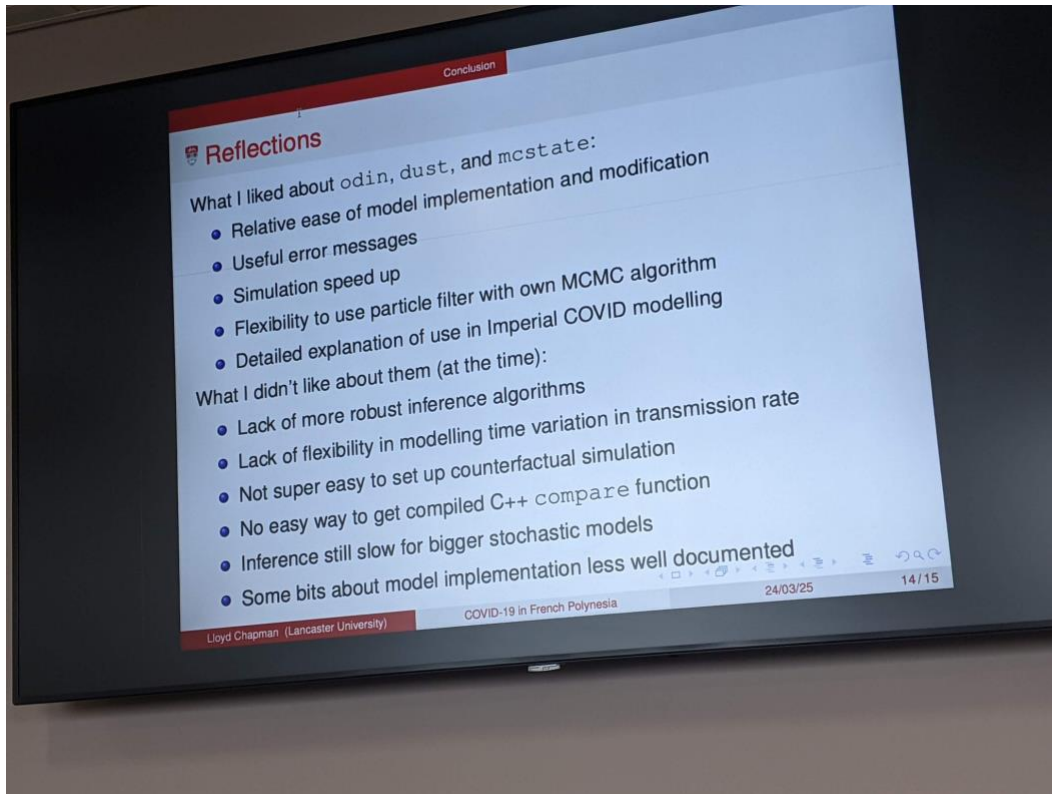
- Participants expressed interest in an inline help function such as "?functionname" for odin/monty syntax, especially during hands-on.
- The `dust_system_simulate()` function raised confusion when called repeatedly; participants encountered unclear error messages. More explicit user-facing messages were suggested.
- Comparison with alternative tools like `pomp` was requested in presentations, especially highlighting performance, flexibility, and inference features unique to odin/monty.
- Chemical kinetics modelling was noted to perform well with large component counts, though may lag with large model sizes. The integration step count was discussed as a key tuning parameter.
- Feedback from Lloyd Chapman's talk on COVID-19 modelling in French Polynesia noted the benefit of clear error messages and flexibility, but raised challenges with PMCMC in high-dimensional settings. He's exploring auxiliary particle filtering as a workaround.
- Expressive priors and collecting intermediate simulation states (for counterfactual analyses) were flagged as desirable features by participants including Carl Pearson.
- Julia Mayer remarked on odin's intuitiveness for basic model translation, but noted that loop constructs and support for more complex control logic remain limited.

### **Frequently Raised Features (Beyond Priority List)**



Common feature requests included:

- Multinomial draws
- A linter for the DSL, recipe-based docs, offline and how-to content
- Automated EDA/report generation, support for multi-stream inference
- vcov(), MLE workflows, better warm-up and counterfactual support
- PDMP, unbiased MCMC, and tempering for SMC
- Typed syntax options, example conversions from other languages
- Hierarchical models and a larger developer team



## Action Items & Recommendations

Workshop participants voted on priorities for future development from 7 options:

- Bound checking and debugging: 7.9
- Automatic differentiation: 6.7
- Parallel tempering: 6.6
- Enhanced monty DSL: 6.55
- Support for events: 6.5
- MPI/HPC support: 6.0
- GPU support: 5.8

These scores will guide both short-term enhancements and longer-term strategic development of the odin, dust, and monty tools. In parallel, we will continue investment

in user-facing infrastructure: including expanded documentation, accessible onboarding materials, community support mechanisms (such as discussion forums), and contributions pathways. Over the coming year, we will aim to integrate as many of the prioritised and frequently requested features as possible. This will include both technical improvements (e.g. multinomial support, improved error messaging, parallel tempering) and efforts to strengthen the surrounding ecosystem for training, collaboration, and model sharing.

## Acknowledgments

The organisers would like to thank all participants for their energy, ideas, and feedback throughout the workshop.

We are especially grateful to:

- The speakers and lightning talk presenters for generously sharing their work.
- The hands-on facilitators for guiding participants through code, tools, and practical exercises.
- The scientific committee for shaping the agenda and contributing to the programme's design.
- The administrative and logistics team at Imperial for ensuring the event ran smoothly.
- The NIHR HPRU in Modelling and Health Economics for supporting the workshop.
- Everyone who has contributed to the development of the odin, dust, and monty tools.
- A special note of thanks to Edward Knock, who contributed extensively to workshop preparations but was sadly unable to attend due to illness.

This workshop would not have been possible without the collective effort of our community.

## Contact

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