

The Met Office and the climate model evaluation community: a story of collaborations, challenges and conversations

Emma Hogan and Alistair Sellar

Introduction

ESMValTool is an open-source, community-driven tool that enables reproducible climate model evaluation and analysis. Climate model evaluation involves comparing hundreds of years of climate model data with observational datasets, then calculating and plotting metrics, which summarise how well the model performs. ESMValTool handles all the steps required to do this, including finding and fixing the required data, processing the data, and calculating and plotting the metrics. ESMValTool has been in development for over 12 years and the international ESMValTool community consists of over 180 members across over 60 international institutes. We are currently in the process of implementing ESMValTool at the Met Office as our primary climate model evaluation tool.

Why we decided to adopt ESMValTool

At the Met Office, we use bespoke, in-house tools to perform climate model evaluation.

Unfortunately, the process of adding new code to our bespoke, in-house tools is slow and scientists find it hard

As a result, there has been little enhancement of the scientific capability of these tools for many years

In addition, the use of bespoke, in-house tools acts as a barrier to collaboration on climate model evaluation code

This has led to us missing opportunities to benefit from science developed by the external climate model evaluation community.

Challenge 2: Suggesting developments respectfully

Problem: The ESMValTool release manager would spend weeks running recipes (and fixing issues) before creating a release.

Solution: We proposed the development of the Recipe Test Workflow (RTW); a Cylc 8 workflow that regularly tests recipes to identify issues sooner, making the release process quicker and easier. A prototype of the RTW was merged into the main code base during the last community workshop in November 2024.

Result: The RTW was well received by the community and recognised as an extremely valuable contribution for the future of ESMValTool, helping to establish the reputation of the Met Office as a valuable partner in the ESMValTool Consortium. The RTW will be used for the next ESMValTool release in January 2025.

Challenge 1: Influencing development strategy

Problem: The Met Office would depend on ESMValTool for mission critical climate model development. Therefore, we wanted to have some influence over the strategic direction of ESMValTool. However, we were unsure how this would work with an open-source tool.

Solution: Thankfully, there was a shared understanding that governance would be important for the sustainability of the ESMValTool community. We facilitated the development and agreement of an ESMValTool governance structure (Figure 1). The ESMValTool Consortium has now been established to oversee this structure with six founding partners in the UK, Germany, Netherlands, Spain and Sweden. The ESMValTool Steering Group is responsible for setting the future direction of ESMValTool and ensuring its sustainable development.

Result: By committing a minimum effort equivalent of 1 full-time person to ESMValTool development, the Met Office has secured membership to the ESMValTool Steering Group and can influence the strategic direction of ESMValTool.

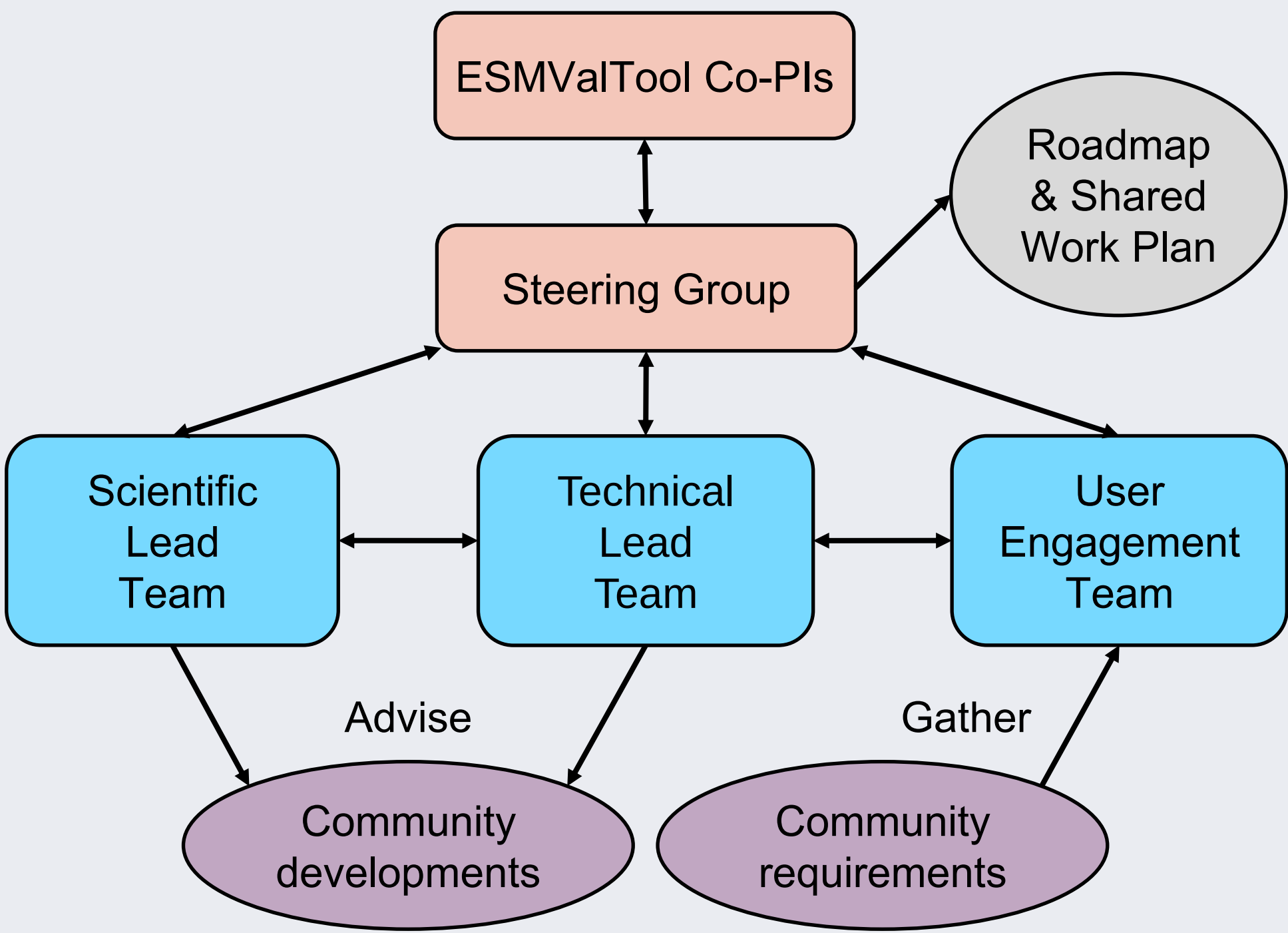


Figure 1: The ESMValTool governance structure

What makes a successful open-source community?

Established guidance from the [Open Source Guides](#) on building successful open-source communities aligns with our experiences of working with an international, open-source community over the past few years. A successful open-source community:

communicates openly and transparently using tools that work for the community

provides the community with a place to congregate, both on-line and in-person, so everyone can help each other

considers a governance or leadership structure

documents all the things to enable the community to quickly get the context they need

maintains a tutorial, to support both users and developers

is responsive by acknowledging queries early to help increase engagement

has a Code of Conduct and commits to creating a welcoming and safe environment for everyone

continually improves by reflecting as a community on how to become more effective

