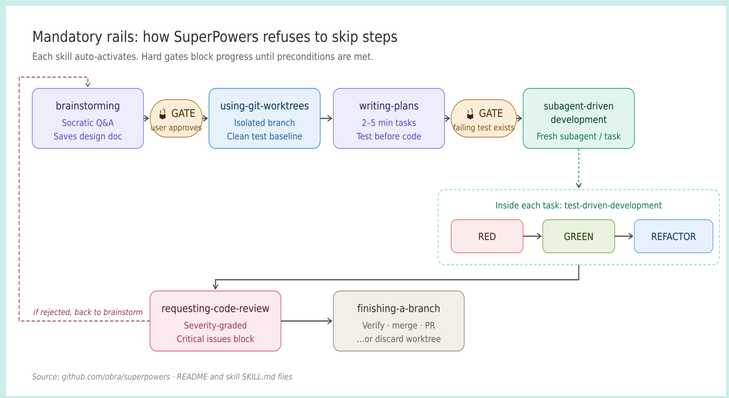
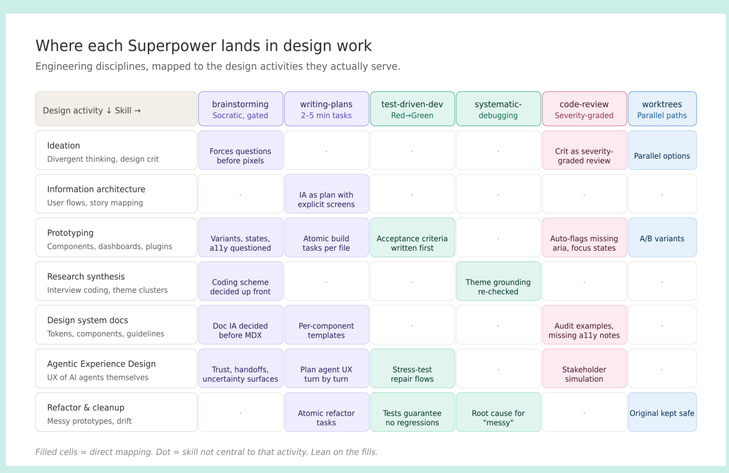
Modernising NAME model and Emergency Response Systems through AI-assisted development

Benjamin Evans, Iva Kavcic, Charlie Tucker, Isaac Jadav, Violet Sherratt, Paul Hazell

NAME: Software development methodology for AI coding agents

Jesse Vincent's "Superpowers"
github.com/obra/superpowers



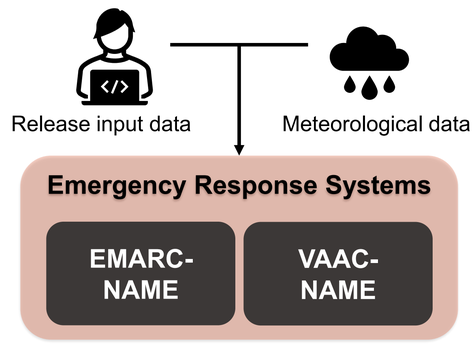


Images from Tommaso Nervegna

Motivation

Numerical Atmospheric-dispersion Modelling Environment (NAME) models a wide range of atmospheric dispersion events such as nuclear accidents, volcanic eruptions, smoke from fires and animal diseases.

Emergency Response Systems (ERS) run NAME to create and deliver operational products to a wide range of customers.

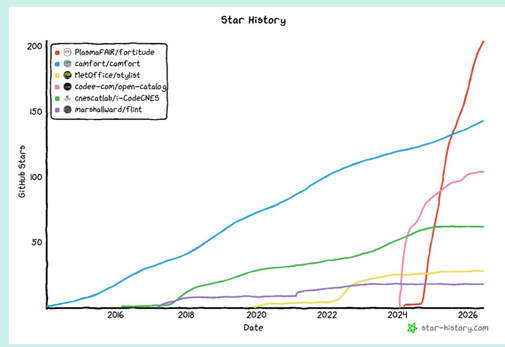


NAME and ERS have been developed over many years and are facing increased operational requirements (e.g. ensemble modelling).

We use sustainable software development practices to support science developers and improve resilience of operational services.

We explore and implement agentic coding and AI-assisted development to modernise NAME and ERS for documentation, testing, code reviews and migration of legacy code.

NAME: Fortran static analysis using Fortitude



Fortitude




```
test.f90:12:32: C161 variable inquiry `present(arg)` and use in \
      same logical expression
   |
12 |         if (present(arg) .and. arg > 0) then
   |                                ^^^ C161
13 |            print *, arg
14 |         end if
   |
```

```
test.f90:22:17: MOD021 [*] deprecated relational operator '.lt.', \
      prefer '<' instead
   |
22 |         if (arg .lt. 0) then
   |                 ^^^^ MOD021
23 |            print *, arg
24 |         end if
   |
   = help: Use '<'
```

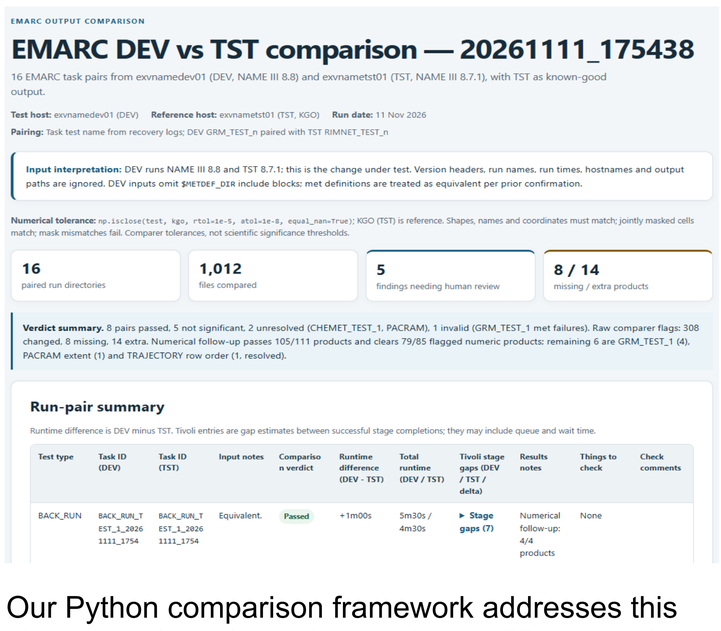

Enables humans to **focus on bigger picture** - logic and design.

SOFTWARE SUSTAINABILITY INSTITUTE

ERS: Bridging gaps in testing with agentic workflows

ERS have evolved in response to operational requirements and significant events. As functionality grows and developers move on, understanding intended behaviour becomes increasingly challenging, making system modernisation difficult.

End-to-end (E2E) testing enables forecasts to be executed on demand, but validating outputs remains challenging. Stochastic models are not bit-reproducible, and ongoing development can introduce legitimate differences. As a result, validation has traditionally relied on scientists and engineers manually reviewing outputs and logs.



Our Python comparison framework addresses this challenge. Agentic workflows detect differences in model outputs and visual products. A custom agent analyses results and extracts operational log evidence. Reports support expert review, reducing manual effort while maintaining scientific oversight.

Outcomes

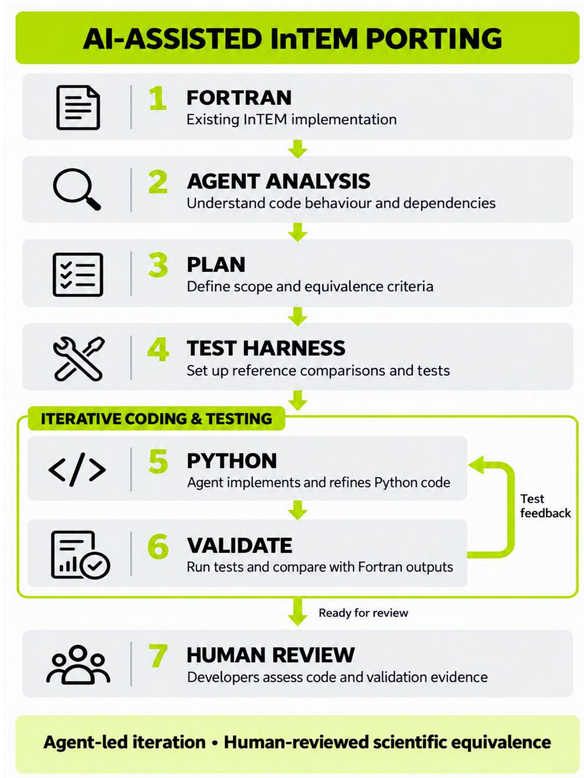
- Automated forecast comparison.
- Extraction of evidence from operational logs.
- Consistent HTML validation reports.
- Reduced manual investigation effort.
- Expert review focused on operationally significant findings.



AI-assisted InTEM porting

InTEM is a source inversion tool used to estimate volcanic ash source terms from satellite observations and **NAME** model output.

To improve portability and maintainability, the remaining Fortran components are being migrated to Python.



Met Office FitzRoy Road, Exeter, Devon, EX1 3PB United Kingdom
Email: benjamin.evans@metoffice.gov.uk,
ML-NC-Applications-ADAQ-Systems@metoffice.gov.uk

© Crown copyright 2026 | Met Office and the Met Office logo are registered trademarks