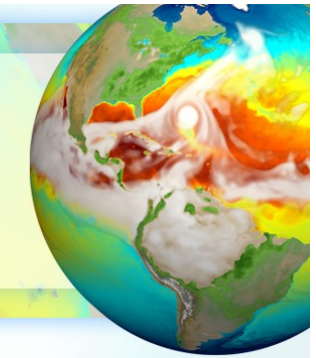
# A Look Ahead to Phase 3



Dave Bader, E3SM Council Chair and Lead PI

**June 2021 All-Hands Meeting**

# Summary from October 2020

- E3SMv1 Simulation Campaign (nearly) complete
- E3SMv1 Model available on GitHub and supported on NERSC and Compy
- Despite limited time for development, E3SMv2
  - is **faster** than E3SMv1 (~2x at standard-resolution)
  - has **better** climate (precipitation, SST, sea-ice, …)
- New **regionally refined** capabilities for **coupled simulations**.
- Simulation campaign to start before the end of the year.- Update – expected to start “soon.”

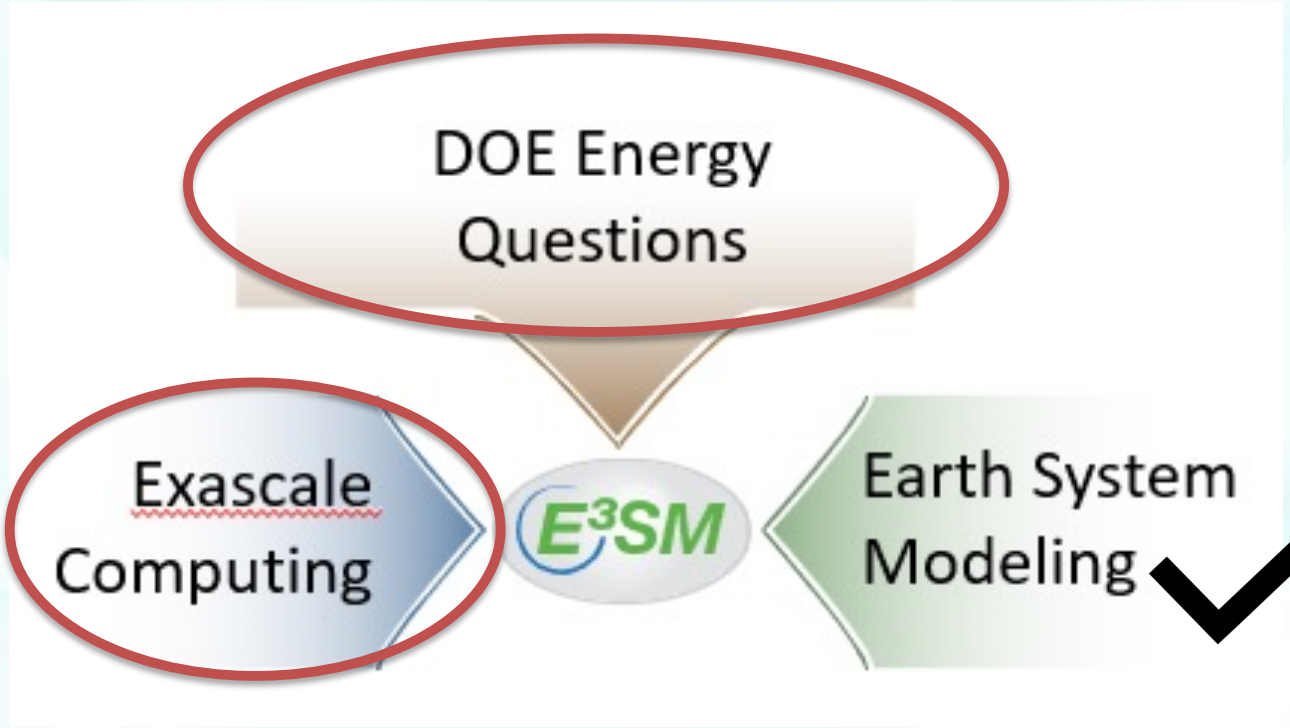
# Since then….

- Project review conducted by BER/EESSD in November 2020
- Project leadership responded to BER Review comments January 2021
- BER accepted response April 2021
- Leadership Team Meeting April 2021
- Schedule for Phase 3 white paper (January 2022) and proposal (July 2022) released
- Planning for Phase 3 underway

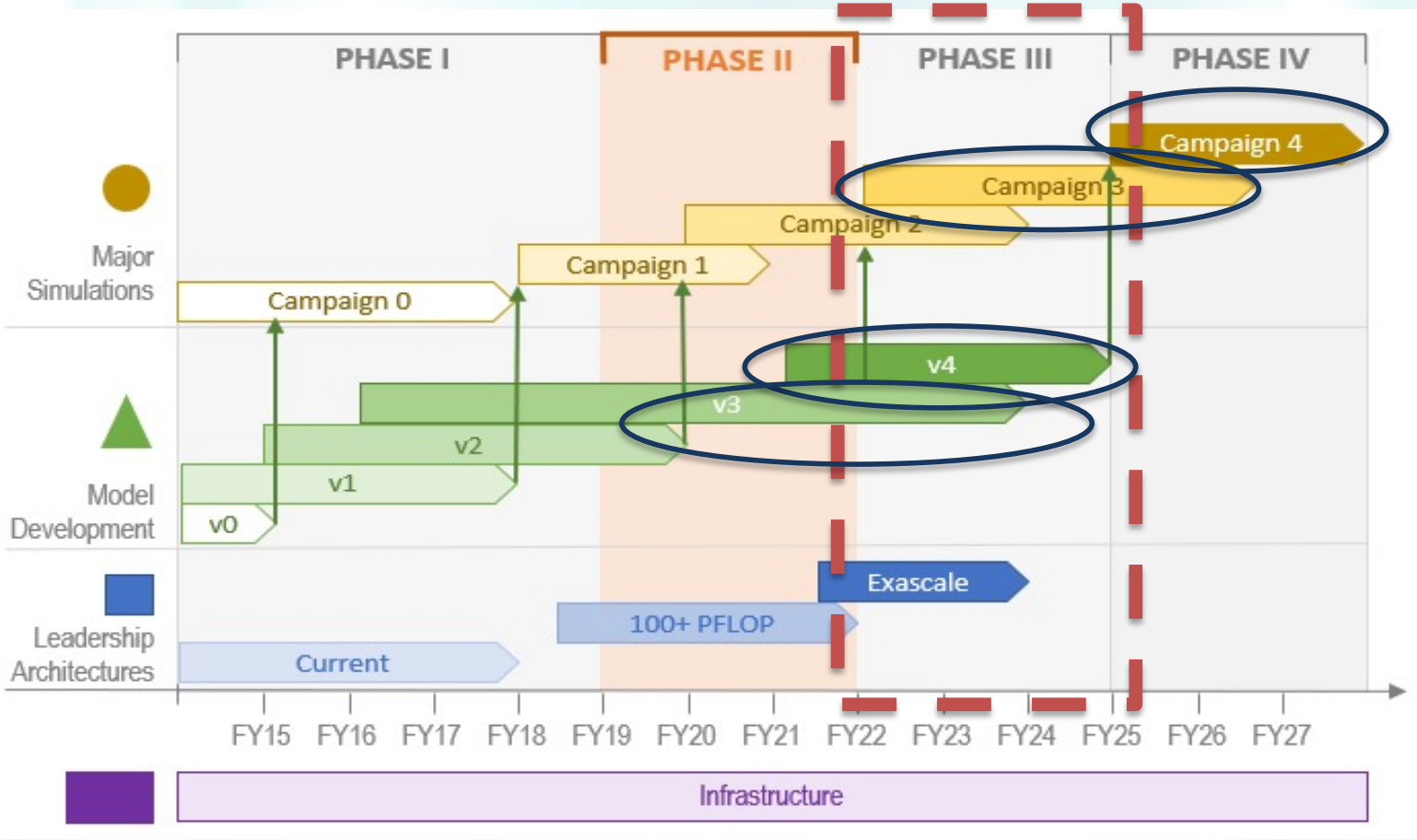
# Strategic Drivers for Phase 3

- *Increase* the **ENERGY MISSION** focus of E3SM
- *Achieve* the **EXASCALE** ambitions of the project
- *Enable* further collaboration with the **DOE Community**
- *Create a* **SINGLE, UNIFIED** code base for each version

# *"A DOE Model for the DOE Mission on DOE Computers"*



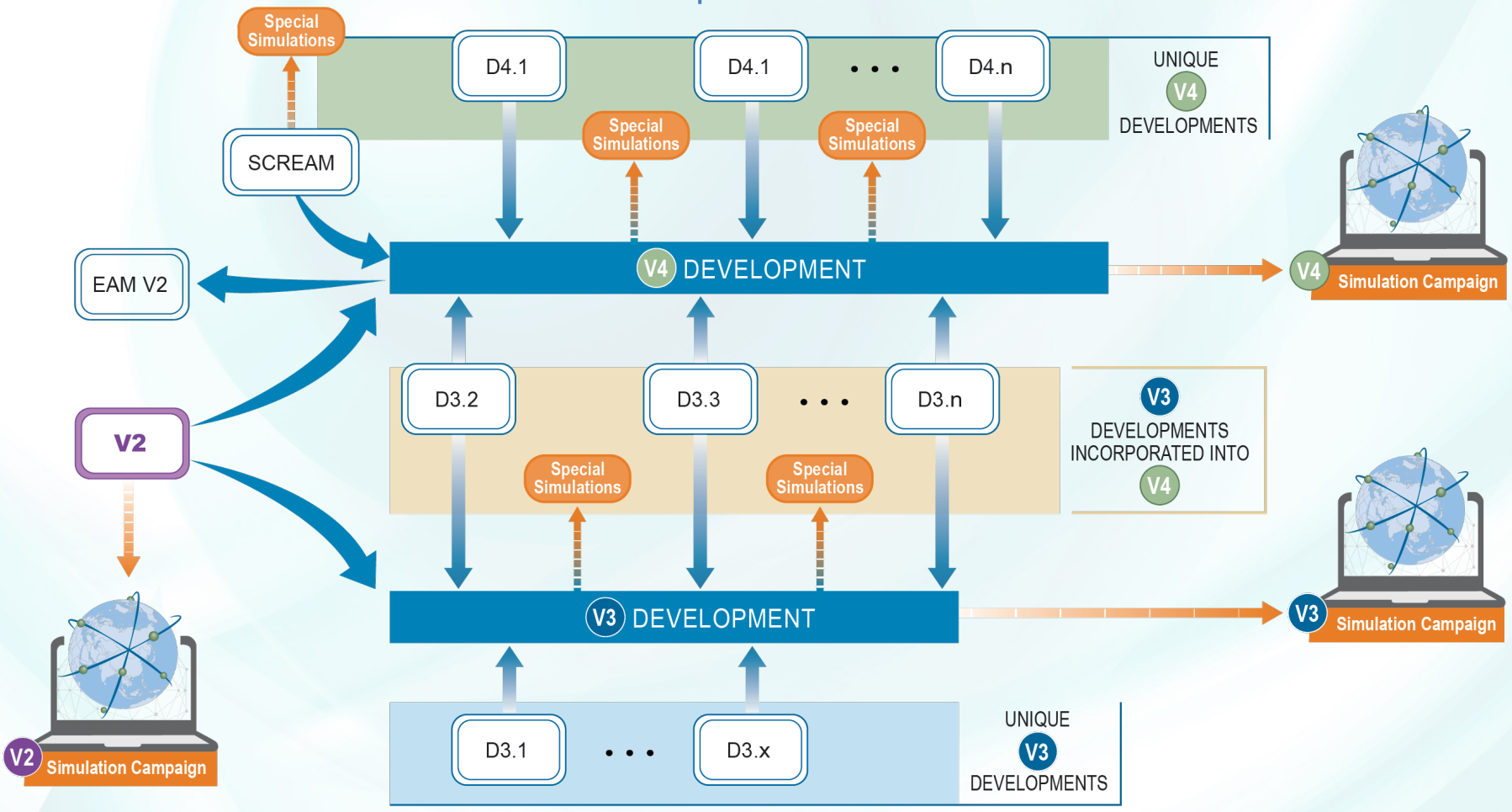
# Overlapping Development Cycle Paradigm Adopted from NWP Centers



# Project Direction - commence parallel, but coordinated, development of v3 and v4

- v3 release date is 12/31/23 (delayed 6 months); the v4 release date is 6/30/26
- Model Science Developments are assigned priorities based on science question needs
- Model Technology Developments are assigned priorities based on needs to run on DOE LCF systems
- Emphasis on high resolution single simulations and moderate resolution or RRM large ensembles with parallel job execution and data reduction
- Single code base for v3 for all science drivers. Starting point is v2 + NGD Land and NGD Atmosphere. Other developments, e.g. some ocean NGD improvements or outside contributions are possible.
- v4 is transformational model run on Exascale machines that requires more development time
- Single code base for v4 for all science drivers. Starting point is v2 + Land NGD + C++ atmosphere (SCREAM codebase). v4 will need to coordinate with v3 developments to include them.

# Roadmap for Phase 3




Conceptual diagram of parallel development paths

# What will be different in Phase 3

- Although E3SM is not a community model, there is a growing community of E3SM contributors and users supported by the BER modeling program
  - Reconsideration of our user and development support policies
  - New code review process to avoid problems with feature integration experienced in Phase 2
  - Twice as many collaboration agreements?
- Developing two versions simultaneously is more complex.
  - Component architects/ lead component software engineers to work with multiple Core Science Groups
  - Intermediate science simulations, e.g. DYMOND
  - Add supported MMF-atmosphere option based on ECP project work
- More unique simulations to address the "DOE mission" part of vision

# We want to hear from you

- Let us know your ideas
- Executive committee members are always reachable by email and phone
- What has worked and not worked from your experience in Phase 2

***Thanks to everyone for your hard work!!***