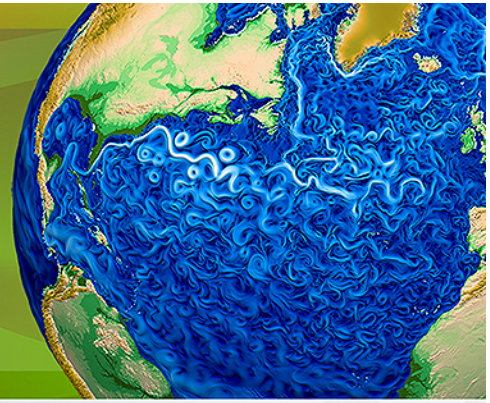
ACME
Accelerated Climate Modeling for Energy



# ACME Ambitions and Status
## *Vision, Goals and Reality*

David C. Bader
ACME Council Chair

May 5, 2015

U.S. DEPARTMENT OF ENERGY

# ACME is Us!!!!

- We are happy you are here.
- Every contributor is important, no matter what her/his role
- The leadership wants to hear what you have to say
- When we succeed, our impact will be lasting

# ACME is Different!!!!

- We need to take fresh looks and question assumptions!
- 100 + people; ~ 50 FTE of Effort.
- 8 DOE Labs, NCAR, several universities, one company
- Cross- and Multi- Disciplinary Team
- Continuously learning and evolving, but with a Plan!!!!

# Why ACME? A DOE Science Vision for Climate Simulation and Prediction

*The Accelerated Climate Modeling for Energy Project is an ongoing, state-of-the-science Earth system modeling, simulation, and prediction project that optimizes the use of DOE laboratory resources to meet the science needs of the nation and the mission needs of DOE.*

"A DOE Model on DOE Machines for the DOE Mission"

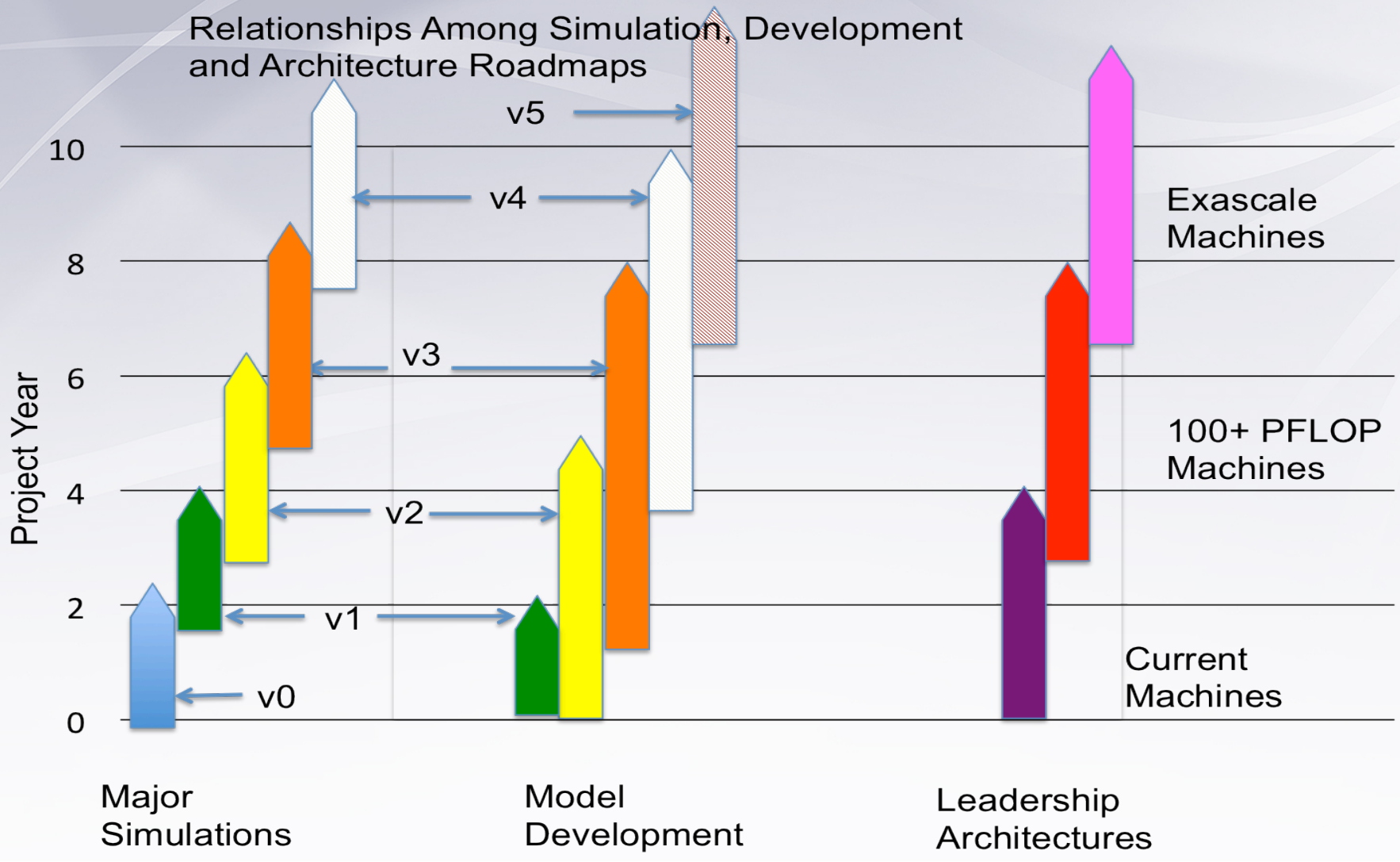
# Ten-Year (2024) Goal

Over the next 10 years, the ACME project will assert and maintain an international scientific leadership position in the development of Earth system and climate models at the leading edge of scientific knowledge and computational capabilities. With its collaborators, it will demonstrate its leadership by using these models to achieve the goal of designing, executing, and analyzing climate and Earth system simulations that address the most critical scientific questions for the nation and DOE.

# ACME Project Elements

- a series of **prediction and simulation experiments** addressing scientific questions and mission needs;
- a well documented and tested, continuously advancing, evolving, and improving **system of model codes that comprise the ACME Earth system model**;
- the ability to use effectively **leading (and "bleeding") edge computational facilities** soon after their deployment at DOE national laboratories; and
- **an infrastructure** to support code development, hypothesis testing, simulation execution, and analysis of results.

# ACME Roadmap



# Three-Year (2017) Deliverables

1. ACME v1 Model Experiments Completed
   1. Water Cycle – Coupled High Resolution Globally
   2. Cryosphere – Global Coupled Model with Refined Resolution Regions in Atmosphere, Ocean and New Ice Processes
   3. BGC – Global Coupled Model with New Terrestrial BGC and Ecological Processes
2. ACME v1 Model Documented and Released
3. All ACME v1 Experimental Data Available

***Model Simulations Must Start by Summer 2016***

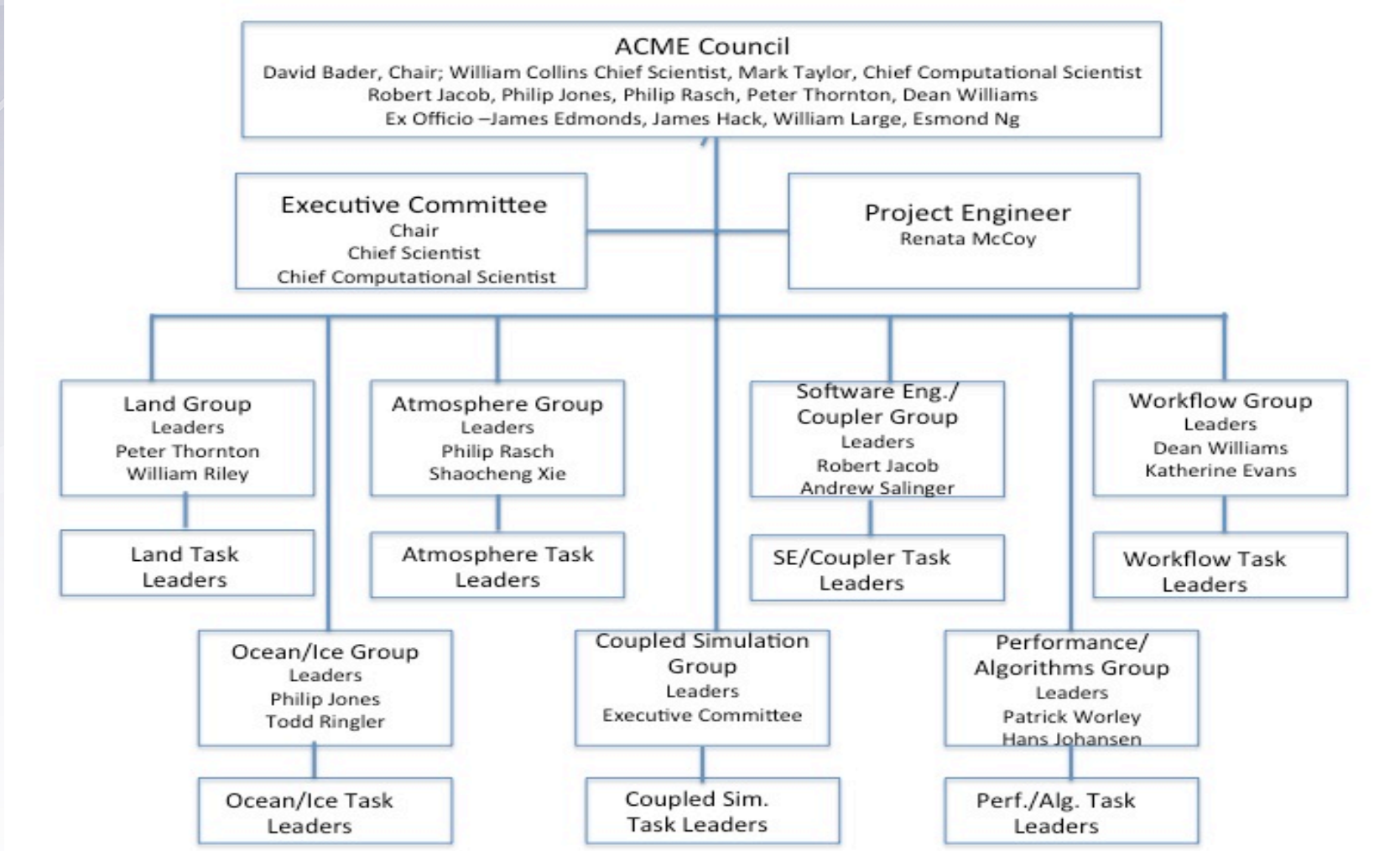
***ACME v1-alpha Completed by January 2016***

***ACME v1 Components Completed by November 2015***

# Organizational Paradigm

- Challenges
  - Redirection of existing projects' funding and people
  - Fragmentation of staff in DOE National Laboratory business model
  - Staff spread across eight labs and many partner institutions
  - Branching from well-established community model (and removing dependence on the community)
- Solution
  - Project guided by roadmaps
    - 3 month, 1 year, 3 year, 10 year milestones
    - Work structured into tasks of duration 3 months or less with well-defined deliverables
  - Flat and flexible organization
  - Accountability and transparency
  - Empower the many task leaders

# Management Approach



# Planning, Proposal and Reviews

- Dec 2012 – First of 6 Planning Workshops
- Jan 2014 – Proposal Submitted
- Mar 2014 – Proposal Review
- June 2014 Hired Full-Time Project Engineer – Dr. Renata McCoy
- July 2014 – After Substantial Revision, Project Approved; Project Strategy and Initial Implementation Plan released
- Oct 2014 – Management Review by BER
- Jan 2015 - Advisory Committee Meeting; 6 Month Peer Review
- Apr 2015 – All Day Council Road Mapping Telecon

# Progress

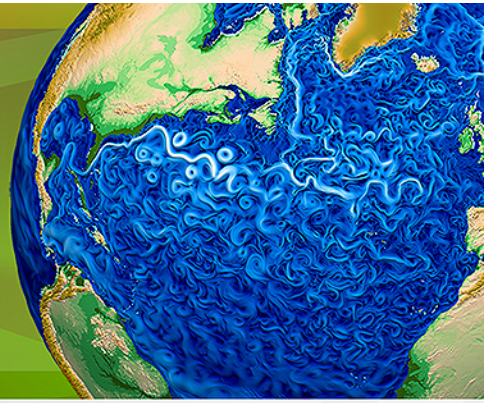
- Established ACME software repository and initial code base for v0 model.  Baseline simulations underway
- Organized tasks among 7 teams
- Awarded INCITE Time
- Successful NERSC (NESAP) and OLCF (CAAR) centers in pre-Exascale collaborations
- Advisory Committee Established – D. Holland, J. Kiehl, T. Delworth, J. Petch, M. Zhang

# Challenges

- Determining precise branch points from CESM codes and establishing rules for collaboration with CESM developers
- Developing infrastructure that will scale to Exascale – requires departures from simply replicating CESM infrastructure
- Understanding and adoption of ACME

# Charge for Meeting

- Interaction and discussion
- Constructive criticism
- Actionable  plans for next six months
- Everyone understands his/her role



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# Questions?

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