

Debbie Bard

Session 5

Title:

Complexity perplexity: how should HPC centers evolve to support the scientific workflows of the future?

Abstract:

The landscape of scientific computing is changing, driven by a confluence of three elements: First, innovation and investment in computing architecture is now being driven largely by AI workloads, with a longer-term focus on quantum computing. If we don't find a way for our users to leverage these innovations, scientific HPC centers risk technological stagnation.

Second, scientists are incorporating AI, simulations and ever-growing datasets into their practice, resulting in increasingly complex scientific workflows operating on our systems. This impacts hardware, software and infrastructure design choices for future supercomputers.

Third, to support future scientific grand challenges, we need better integration between all DOE facilities. This was highlighted in the 2024 ASCAC Facilities Review, which advocated that "ASCR facilities be viewed not as isolated entities, but as integral components of a single, larger integrated computational ecosystem..., with a single governance model". The Integrated Research Infrastructure (IRI) program has been developed to guide the convergence and harmony across sites needed to enable this vision, whilst retaining the unique missions and capabilities of DOE user facilities.

In this talk I will explore the implications of these elements of change, examining the new models of integrated infrastructure, software environments and user support that are needed to meet the needs of the scientific workflows of the future.

Bio:

Debbie Bard is a physicist and data scientist with 20 years experience in scientific computing, working in particle physics, cosmology and HPC. She leads the Science Engagement and Workflows department at the National Energy Research Scientific Computing center (NERSC), responsible for supporting and engaging NERSC's 11,000+ users. She leads the Superfacility initiative at Lawrence Berkeley National Lab, and is Chair of the Leadership group for the DOE's Integrated Research infrastructure program, developing an ecosystem to integrate experimental facilities and HPC.