

U.S. Department of Energy



Office of Science

Advanced Scientific Computing Research Program

U.S. Department of Energy's Office of Science

Independent Review: Leadership Class Facilities

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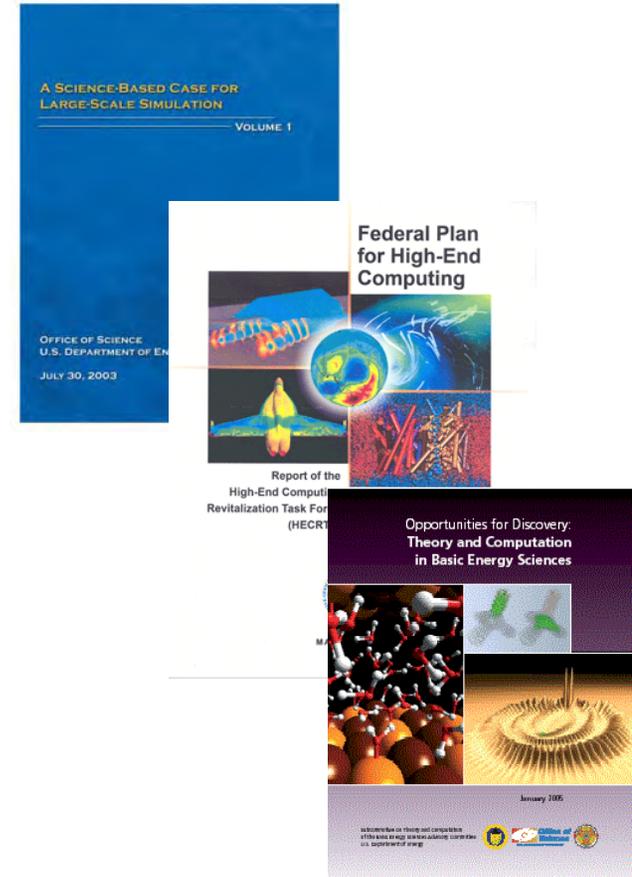
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Leadership Computing Facilities (LCF) FY2007 and beyond

Advanced Scientific Computing Research Program

- Upgrade LCF at ORNL (OLCF)
 - Upgrade Jaguar (Cray XT3) to 250 Teraflops by end of 2007
 - Acquire 1 Petaflop system by end of 2008
- Establish LCF at ANL (ALCF)
 - Acquire 100 Teraflop IBM Blue Gene/P in FY 2007
 - Upgrade to 250-500 Teraflops in 2008



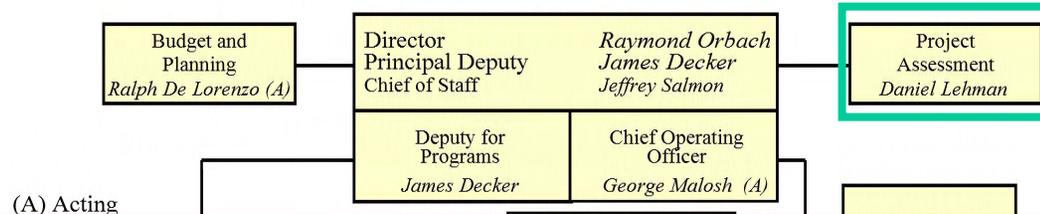


Independent Reviews

Advanced Scientific Computing Research Program



OFFICE OF SCIENCE



The Office of Project Assessment provides independent advice to the Director of the Office of Science (SC) relating to those activities essential to constructing and operating major research facilities. In addition, this office provides professional management and staff support regarding these functions to SC program offices.



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HPC “Project” Characteristics

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- **Time**
 - Life expectancy of computer technology measured in **years** not decades
 - Resources must be deployed in timely fashion to provide computing capability to scientific community before it becomes obsolete.
- **Complexity**
 - Leading edge high performance computer systems and related peripherals and advanced networking
 - Development (scaling) and deployment of system and application software
- **Scope**
 - Project may be a component of existing user facility – NERSC, LCF at Oak Ridge
 - Steady state phase is considered outside scope of a project
 - Maintenance
 - Operations
 - Majority of Lease Payments



HPC Projects Independent Reviews

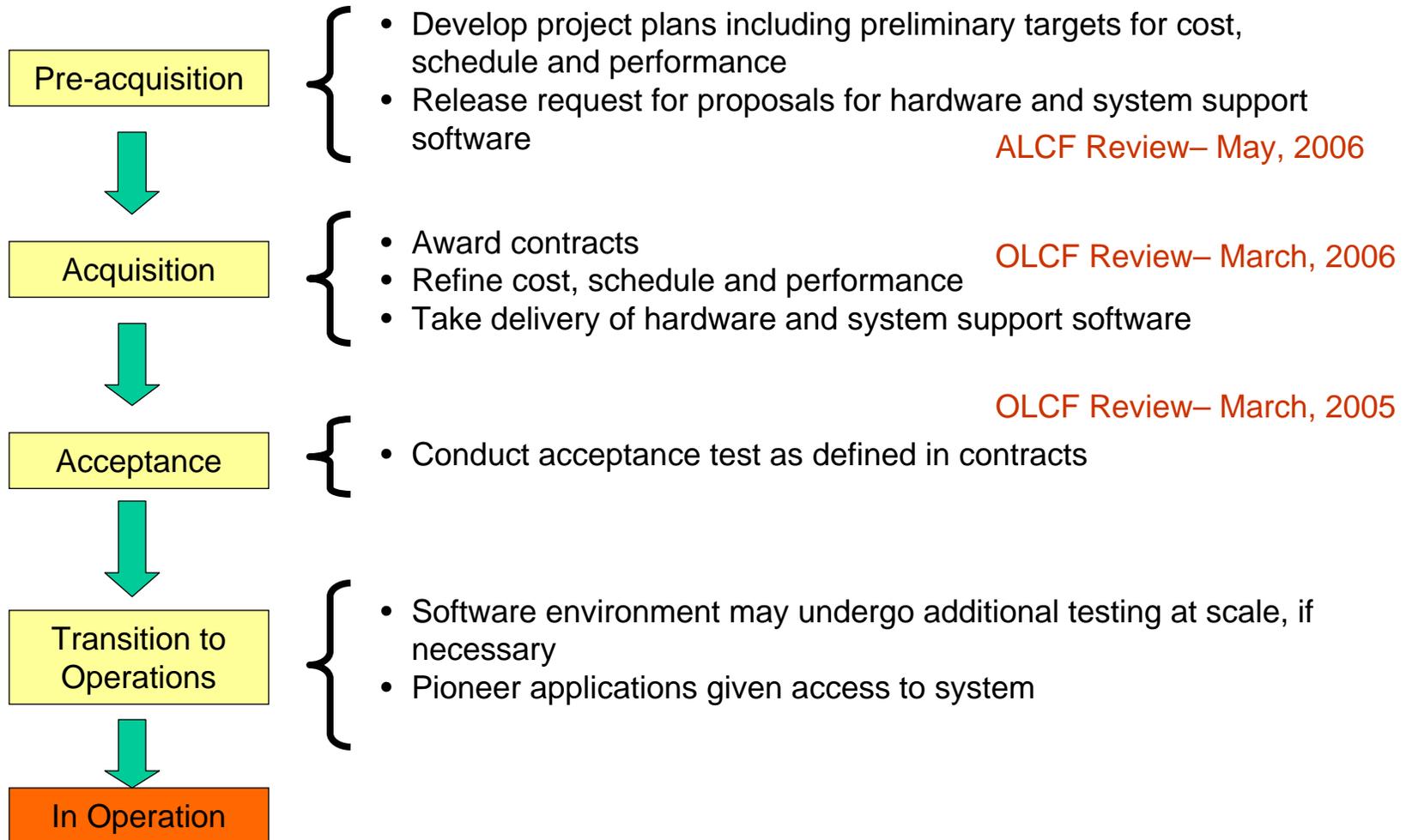
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- Purpose:
 - To review LCF site's plan to
 - Acquire/upgrade Leadership Class machines and
 - Operate a Leadership Class facility
 - To establish project baseline in accordance with OMB 300 reporting requirements
 - Cost, including total project cost
 - Scope
 - Schedule
- When:
 - Predetermined phases in the LCF project
 - As needed



Phases

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Review Components

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- Charge
 - Developed with Office of Project Assessment (OPA) in with LCF site
- Review
 - Broad review panel with representation from a cross-section of scientific disciplines, other DOE HPC facilities and other agencies HPC facilities, including project managers
 - Normally 1 1/2 days in length
- Report
 - Findings
 - Comments
 - Recommendations



Sample Charge

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- Is the technical approach to address SC scientific computing needs reasonable? **Pre-acquisition**
- Are the major technical risks addressed? **Pre-acquisition, Acquisition**
- Does the plan adequately define the scope, schedule, and cost to acquire, install, and operate the proposed hardware? **Pre-acquisition, Acquisition, Acceptance**
- Are the plans for maintenance and operations sufficient? **Pre-acquisition, Acquisition, Transition to Operations**
- Does the management organization responsible for the LCF have the expertise, experience, and resources to successfully deploy and maintain the proposed hardware and upgrades? **Pre-acquisition**



Representative Review Recommendations

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- **Is the technical approach to address SC scientific computing needs reasonable?**
 - Identify the minimum capabilities necessary to meet scientific objectives for a select set of applications with minimal support requirements
 - Document the scientific roadmap and associate computing requirements of each of the high-priority applications
 - Extend the duration of Grand Challenge awards beyond one year
- **Are the major technical risks addressed?**
 - Plan in-depth contingency plans in the event of complications for each upgrade step
 - Develop a detailed risk plan



Review Recommendations (Cont.)

Advanced Scientific Computing Research Program

- Does the plan adequately define the scope, schedule, and cost to acquire, install, and operate the proposed hardware?
- Are the plans for maintenance and operations sufficient?
- Does the management organization responsible for the LCF have the expertise, experience, and resources to successfully deploy and maintain the proposed hardware and upgrades?
 - The acceptance test should be reviewed.
 - Develop a detailed software project management plan
 - Do a “bottoms-up” based staffing analysis
 - Develop and maintain a Project Execution Plan that includes a project baseline, major milestones, risk management plan, etc.



Review Status

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- **LCF at ORNL**
 - March, 2005 – to establish steady-state baseline of Cray XT3 and Cray X1
 - March, 2006 – to establish project baseline for 250 TF Cray XT3 upgrade, 1000 TF Cray Baker acquisition
 - October 11-12, 2006 – Follow-on review
- **LCF at ANL**
 - May, 2006 – to establish baseline for IBM Blue Gene/P acquisition
 - October 17-18, 2006 – Follow-on review



Conclusion

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- The independent review is a valuable tool in the management of HPCE and LCF projects
 - Establishes a foundation for ASCR to manage the delivery of High Performance Computing (HPC) and Leadership Class Computing (LCF) resources within predetermined thresholds for cost, schedule and performance
 - Reduces risk associated with stated objectives