



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

Program Area Presentation

Advanced Computing Research Testbeds

Advanced Scientific Computing Research
Strategic Planning workshop

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Advanced Computing Research Testbeds

Contribution of Program Element to Overall ASCR Strategic Goal

- The Advanced Computing Research Testbed (ACRT) program serves two principal objectives:

Computational Science Partnerships: Providing tailored high-end computing resources to specific, focused scientific communities to support their exploration and assessment of new research capabilities; and

Technology Assessment: Assessing the potential of new computing technologies for advancing scientific applications critical to the mission of the Office of Science.



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Planning horizon for Program Element

- Planning horizon determined by:
 - availability of new computer architectures – about 3 years; and
 - Evolution in the science applications – about 5 to 10 years



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Areas of research Program Element currently invests in

- ACRTs house interdisciplinary teams of researchers, drawn from science and engineering applications disciplines, computational mathematics and computer science.
- These teams focus on application development to harness the power of advanced architecture computers for the solution of computationally intensive, large-scale scientific and engineering problems.
- Current ACRT applications research includes:
 - Biology
 - Climate
 - Fusion
 - Materials



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Areas of research Program Element currently invests in

- ACRTs evaluate promising new computer architectures and explore the advantages and limitations of other new computing technologies for use in solving scientific problems that are critical to the accomplishment of the mission of the Office of Science.
- ACRT technology evaluation activities include:
 - early evaluation of new computer architectures;
 - strong interactions with both the computer industry and industrial users of high-end computing;
 - development of science-based performance metrics;
 - assessment of novel algorithms;
 - exploration of new applications domains;
 - computer and applications code performance evaluation;
 - assessment of tools and software environments;
 - assessment of new database and networking technologies; and
 - other activities appropriate to the technology assessment role.



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How does Program Element transfer knowledge or provide services to application scientists?

- Direct involvement with applications research teams
- Strong interactions with both computer and applications industries
- University ties
- Multi-institutional teams
- Education and outreach
- Technology transfer and commercialization



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Program Element Strengths

- Integrated activity with natural, built in success metrics
- Directly addresses SC science mission needs



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Program Area Weaknesses

- Shares the weakness of all cutting edge computational science, in that it is dependent on the health of the high end computing industry



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Program Element Opportunities

- The timing is the best that it has been in over a decade for a renewed push in high end computing – and the ACRT is the right venue for this push
- Carpe Diem!



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Program Element Threats

- Delay in a renewed emphasis may provide other countries with a lead which could take decades to overcome



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Program Element Gap Analysis

- Shortage of personnel trained to carry out the computational science partnership and technology assessment roles