U.S. DEPARTMENT OF ENERGY | Office of Science

Committee of Visitors (COV) Response

July 21, 2022

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ASCR Research COV Charge & Timeline

ASCR Research Programs Only

For both the DOE laboratory projects and the university projects, assess the **efficacy and quality of the FY16-FY19 processes** used to:

- Solicit, review, recommend, and document actions, and
- Monitor active award, projects and programs

Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected:

- The **breadth and depth of portfolio elements**
- The degree to which the program is anticipating and **addressing emerging challenges from high performance computing and DOE missions**, and
- The **national and international standing** of the program with regard to other computational science programs that are also focused on harnessing high performance scientific computing and utilizing massive datasets to advance science

COV Timeline:

Charge Letter – October 19, 2020

COV Review – August 18-19, 2021, virtual

COV Report– May 9, 2022

COV Response – July 21-22, 2022, already posted here: https://science.osti.gov/sc-2/Committees-of-Visitors/ASCR-COV

ASCR Research COV Members

Alexandra (Sandy) Landsberg (Chair), Office of Naval Research: Applied Mathematics

Juan Meza, University of California Merced / National Science Foundation: Applied Mathematics

Almadena Chtchelkanova, National Science Foundation: Computer Science, SciDAC

Tatjana Curcic, Defense Advanced Research Projects Agency: Quantum Information Science

Fariba Fahroo, Air Force Office of Scientific Research: Applied Mathematics, SciDAC

Rudolf Eigenmann, University of Delaware: Computer Science

Jeffrey Hollingsworth, University of Maryland: Computer Science

William Johnston, National Energy Research Scientific Computing Center (Retired): Networking Research

David Keyes, King Abdullah University of Science and Technology / Columbia University: SciDAC

Guglielmo Scovazzi, Duke University: Applied Mathematics

Wolfgang Bangerth, Colorado State University: Applied Mathematics, Computer Science

Our heartfelt thanks to all COV members for their thoughtful comments!

ASCR Research Highlights – 2016-2019

Embracing the Exascale Era

- Exascale Computing Project (ECP) launched, continued investments in core basic research

Looking Beyond Exascale

- Quantum information science and artificial intelligence

Expanding Partnerships

- Forged connections with non-traditional partners

Growing Workforce

- Increased investments in Early Career and CSGF

Tally & Breakdown of 21 COV Recommendations

Program Elements: 1 - Processes & Awards 2 - Portfolio & Impact	Research Programs					
	ASCR Overall	Applied Mathematics	Computer Science	Computational Partnerships	Research & Evaluation Prototypes	Tally
1A. Solicit, Review, Document Actions	2	2	1	1	0	**6**
1B. Monitor Active Projects & Programs	1	1	0	0	0	**2**
2A. Portfolio Breadth & Depth	1	1	1	1	1	**5**
2B. Anticipate & Address Emerging Challenges	1	2	2	0	0	**5**
2C. Stature in HPC & Data	0	0	0	2	1	**3**
	5	**6**	**4**	**4**	**2**	**21**

1A. Solicit, review, recommend & document proposal actions: 6 Recommendations

	ASCR Overall, Applied Math, Computational Partnerships	ASCR Overall	Applied Mathematics	Computer Science
Recommendation	Implement a **pre-proposal process** to reduce the burden on the community. The effort should document the process of how pre-proposals will be reviewed and by whom. ASCR should consider establishing target ratios of encouraged pre-proposals to proposals able to be funded, i.e., encourage only 2-3x the number of proposals a solicitation could support.	COV presentations should provide clear summary statistics for each solicitation including a **random, representative sampling of reviewed proposals** to facilitate COV analysis of processes and procedures.	Develop mechanisms to increase the **diversification** of PIs to continuously bring in new thinking.	ASCR should develop ways to **inform the community** about related programs that PIs may consider, especially for programs that are being reduced.
Proposed Response	ASCR agrees with this recommendation…. **an internal pre-application review process** that involves federal program managers, or DOE affiliated personnel under the direction of federal program managers has been initiated across SC. This process is described in detail in the solicitations including the review criteria to be used and how to request feedback. ASCR has used this process since the beginning of FY2020.	These statistics are made available to the COVs through **PAMS**. ASCR will also include these statistics in the resources provided to the COVs outside of PAMS.	…Beginning in FY2022, we started following **a two-pronged approach** to increase the diversity of principal investigators: 1) Increase the diversity of applicants by implementing amplification plans…; and 2) Based on the recommendations of the SC-wide DEI working group, implement Program Policy Factors in the solicitations... ASCR will **continue to expand** its mechanisms to increase the participation of diverse community members in its activities including technical workshops...	Since 2021, ASCR started advertising the research division priority areas for the upcoming fiscal year during the **ASCAC meetings** to keep the community members informed of potential funding opportunities to which they may be able to apply. Funding opportunities… are also shared via **DOE's GovDelivery email** service with over 3000 ASCR subscribers.

1B. Monitor active projects & programs: 2 Recommendations

	ASCR Overall	Applied Mathematics
Recommendation	The COV applauds DOE Office of Science and ASCR for their investments in **early-career researchers**. Beyond ECRP, the COV recommends that ASCR investigate strategies to identify early (and early mid-career) researchers with significant promise and ways to enable them to develop into principal investigators (PIs) of large DOE projects. ASCR should consider defining a desirable goal for such investigators between DOE laboratory staff and the broader research community.	Establish **measures** for math centers (MMICCs, CAMERA) and long-term laboratory projects to document impact/effectiveness.
Proposed Response	ASCR agrees with this recommendation. ASCR PMs proactively keep track of their ECRP awardees' professional progress and offer leadership roles in workshops, reviews, and other community events that they organize. A successful mechanism to enhance ECRP researchers' awareness of the ASCR's research programs is through participation in ASCR review panels; the ASCR PMs have been deliberate in balancing the composition of the review panels to incorporate the ECRP researchers and researchers from minority serving institutions and underrepresented groups. In FY2021, **Office of Science Communications and Public Affairs started a "Then and Now" feature** in the Office of Science homepage solely focused on the career highlights of our ECRP cohorts. The inspiring stories from our awardees not only offer the best evidence for the success of our program but also provide a great opportunity for the awardees to increase visibility in our community.	ASCR agrees with this recommendation. ASCR Applied Mathematics has **a strong, 60-year track record of impact and effectiveness**. The MMICCs' impact and effectiveness have been documented in the annual reviews where the peer-reviewers are asked to comment on the long-term impact of each center. Merit review processes and progress monitoring will continue to focus **on project excellence, relevance, and leadership metrics**.

2A. The breadth & depth of portfolio elements: 5 Recommendations

	ASCR Overall	Applied Mathematics, Computer Science	Computational Partnerships	Research & Evaluation Prototypes
Recommendation	ASCR should develop procedures to better communicate the **impact of programmatic shifts.**	Re-establish **university-based small group and single PI program** to increase diversity of research topics, germinate new ideas and potentially forge new university/laboratory partnerships.	Clearly define, articulate, and communicate **SciDAC strategic goals and technical shifts**.	ASCR should establish a process to encourage applied mathematicians and computer scientists to **experiment on quantum testbeds**.
Proposed Response	ASCR agrees with this recommendation. While budget updates are routinely presented in public meetings such as **ASCAC meetings**, ASCR will **improve** its communication to describe the budget interdependencies among its sub-programs and to clarify the implications of programmatic shifts.	ASCR agrees with this recommendation. Since FY2017, ASCR has re-established the **EXPRESS (Exploratory Research for Extreme-Scale Science) program** to initiate new research and collaborations in universities and laboratories across diverse topics such as quantum algorithms and mathematical models, and federated learning. EXPRESS allows ASCR to enable high-risk, short-duration investigations to see if a topic is ripe for future expansion into a larger program.	ASCR agrees with the recommendation. ASCR will continue to engage the community in identifying research and partnership priorities that advance DOE missions and Administration goals. ASCR will also leverage the **SciDAC Coordination Committee** to better understand the impacts of changes in the Computational Partnerships portfolio and will ensure ASCAC is publicly briefed on the resulting report.	2 ASCR quantum computing testbeds are the Quantum Scientific Computing Open User Testbed (QSCOUT) at SNL and the Advanced Quantum Testbed (AQT) at LBNL. These testbeds have been **available to external collaborators on a competitive basis since 2020** and ASCR has advertised them to the research community, including applied mathematicians and computer scientists, via presentations at ASCAC, SIAM meetings, and similar venues and plans to continue to do so. Additionally, ASCR ensured that both communities were represented on the organizing committee for the **2021 Quantum Computing Testbeds Stakeholder Workshop**…

2B. Anticipating & addressing emerging challenges from high performance computing & DOE missions: 5 Recommendations

	ASCR Overall	Applied Mathematics, Computer Science	Applied Mathematics	Computer Science
Recommendation	ASCR Research should identify and document their "**North Star**", including a clear vision and mission statement and accompanying five-year plan, to provide clarity of priorities to internal and external stakeholders. ASCR should **include indicators/measures** of success to evaluate progress towards the goals of the plan.	Identify and explore **new and emerging areas of research** beyond current initiatives.	Develop mechanisms to encourage applied mathematicians to **experiment on ASCR quantum testbeds**.	Define **success targets** to assess existing program outcomes after 5 and 10 years.
Proposed Response	Since 2021, ASCR initiated an annual update on its research priorities during the Fall ASCAC meetings…ASCR Research will continue to focus **on excellence, relevance, and leadership indicators recommended by the National Academies**, validated through merit review and documented in selection statements. Additionally, in March 2022, ASCAC has been charged with an **international benchmarking study** to assess leadership. Based on the recommendations of this study, ASCR will refine the measures of success for its research programs.	ASCR agrees with this recommendation. ASCR research investments are driven by **administration priorities and community input**. Since 2018, ASCR Research has employed a systematic approach to gather and build on community input; a balanced combination of targeted discussion sessions, roundtable discussions, active engagement in interagency activities and **Basic Research Needs (BRN)** workshops.	See previous slide.	ASCR agrees with this recommendation. ASCR Research will continue to focus on **excellence, relevance, and leadership indicators recommended by the National Academies**. ASCR will continue to refine priorities for its programs to maximize impact on the research community, industry, and the broader scientific and technology ecosystem.

2C. National & international standing in using high-performance scientific computing & massive datasets to advance science: 3 Recommendations

	Computational Partnerships (1)	Computational Partnerships (2)	Research and Evaluation Prototypes
Recommendation	Initiate an external, **holistic view of SciDAC over its entire lifetime** to document/formalize strategies, goals, methodologies, and value of the program: • Articulating the benefits of SciDAC to the base Math and Computer Science programs (the best research transports knowledge bidirectionally from basic research to applications and back). • Identifying benefits of and lessons learned from the SciDAC program and find ways to realize similar benefits with other programs as well.	Presentations should focus on the **"story"** necessary for the COV to understand the state of the program.	ASCR should continue to emphasize the need to expand **diversity in the CSGF program**.
Proposed Response	ASCR agrees with the recommendation. SciDAC is a **cross-cutting program** within DOE that includes six SC core program offices as well as the Office of Nuclear Energy. ASCR is developing **a new charge for ASCAC** that reflects the cross-cutting nature of the program, to document the benefits and lessons learned from SciDAC. In addition, the FY2023 budget request includes plans to expand SciDAC partnerships to the DOE applied energy programs.	ASCR will add **an executive summary slide** to the COV presentation template for each research subprogram, including Computational Partnerships.	ASCR agrees with this recommendation. The CSGF is **managed through a grant** to the Krell Institute, which has made significant gains in expanding the diversity of the fellows and institutions that participate in CSGF. ASCR will continue to emphasize this in reviews of the program.