Overview of ASCAC Subcommittee Report

Computational Sciences Graduate Fellowship Program

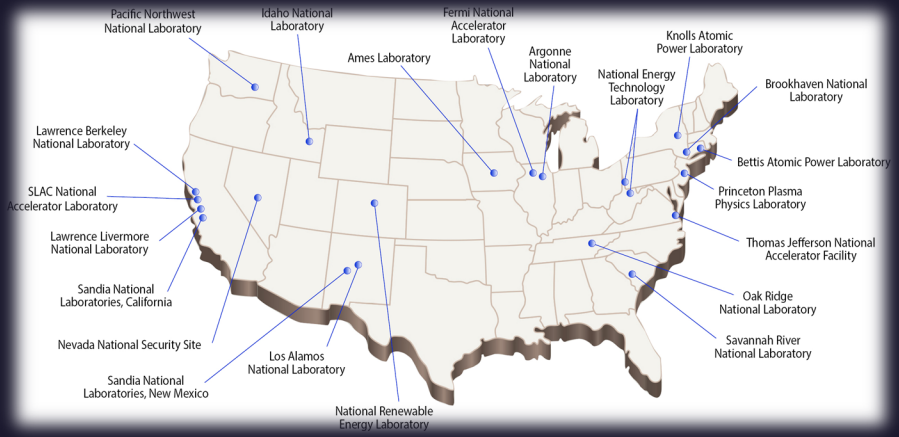
January 16, 2025

CSGF is supported by DOE Office of Science (ASCR) and NNSA (ASC)

DOE Program Managers: Christine Chalk/OS/ASCR; David Etim/NNSA/ASC

PI: Shelly Olsan, Krell Institute, President

Co- PIs: David Brown, LBNL (retired); Jeff Hittinger, LLNL, Director for Center for Applied Scientific Computing



- To help ensure an adequate supply of scientists and engineers appropriately trained to meet national workforce needs, including those of the DOE, in computational sciences.
- To raise the visibility of careers in the computational sciences and to encourage talented students to pursue such careers, thus building the next generation of leaders in the field.
- To provide practical work experiences for the fellows that allows them to encounter the cross-disciplinary, team-based, scientific research environment of the DOE National Laboratories.
- To strengthen collaborative ties between the academic community and DOE National Laboratories so the fellowship's multidisciplinary nature builds the national community of scientists.

Charge to ASCAC Chair from Acting Director, Office of Science

Examine effectiveness and impact of CSGF and the quality and breadth of the program over the past decade.

- Does CSGF provide students with an effective and impactful program of appropriate quality and breadth?
- Is there a unique role for CSGF in the landscape of federal graduate fellowship programs?
- Is the program attracting diverse applicants and making awards to diverse cohorts?
- How can CSGF reach a broader applicant pool?
- Is the program appropriately tailored to support the computational scientist workforce needed at the DOE laboratories?
- What is the most effective governance model for the program?
- How should the CSGF evolve to ensure the best experience for students?
- Is the program appropriately supporting students at institutions historically underrepresented in the federal research landscape?

ASCAC Subcommittee Members (CSGF)

Irene Qualters (ASCAC) LANL (retired), Chair	Valerie Taylor (ASCAC), ANL, Co-Chair Director of the Math and Computer Science Division
Tina Brower-Thomas (ASCAC), Howard University College of Engineering and Architecture The Graduate School	Barney Maccabe, University of Arizona Executive Director, Institute for the Future of Data and Computation
Susan Gregurick (ASCAC), NIH Associate Director for Data Science and Director of the Office of Data Science Strategy	Prasanna Balaprakash, ORNL Director of AI Programs and Distinguished R&D Staff Scientist
Mark Segal, NSA Deputy Director of the Research Directorate	Jen Gaudioso, SNL Director, Center for Computing Research
Stefan Wild, LBL Division Director & Senior Scientist Applied Mathematics and Computational Research	David Torres (ASCAC), Northern New Mexico College Associate Professor, Mathematics and Physical Sciences
William D. Gropp, UIUC Director, National Center for Supercomputing Applications Grainger Distinguished Chair in Engineering Seibel School of Computing and Data Science	

CSGF Report Summary

Overall Evaluation: *Examine the effectiveness and impact of CSGF and the quality and breadth of the program over the past decade.*

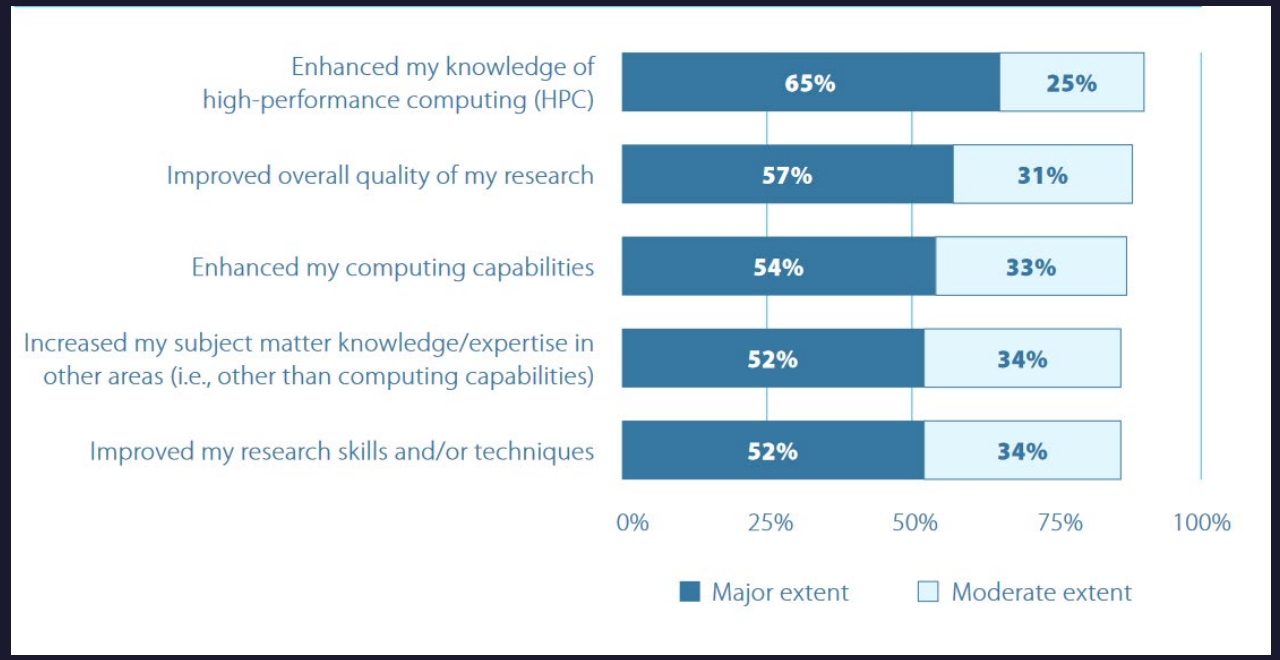
Summary Conclusions – CSGF Decadal Review

- **Program is of very high quality with broad and enduring impact. Areas of excellence include:**
  - CSGF program objectives remain clear, compelling, and essential to DOE and the nation
  - Program components collectively constitute a unique federal program that meet the program objectives
  - Core operational processes ensure high quality
  - Program has successfully demonstrated adaptability and agility (e.g., growth, recruitment, program components)
  - Longitudinal data capture allows robust analysis of progress (e.g., fellow demographics, reach to universities, career impacts)
- **Recommendations**
  - Maintain areas of excellence: continue to evolve program components; adapt student experience; robust data capture & evaluation
  - Efficiently grow the program
  - Translate CSGF objectives to a strategic plan with 5 to 10-year measurable goals and priorities
    - Engage stakeholders in strategic plan creation and implementation
    - Adapt governance structure to strategic plan
    - Communicate plan, governance, results

CSGF Report

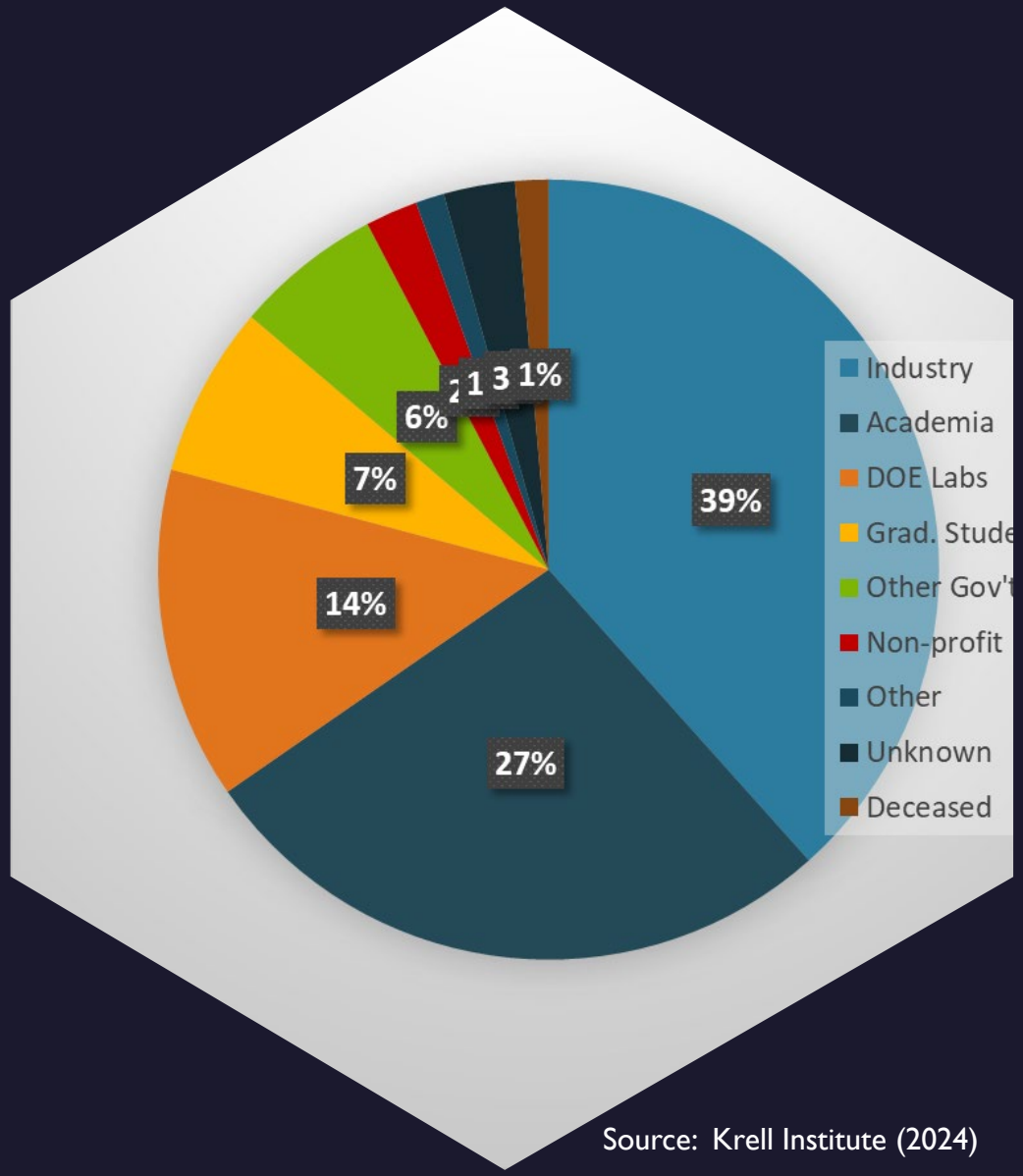
Response to individual charge questions

Does CSGF provide students with an effective and impactful program of appropriate quality and breadth?



Source: https://www.krellinst.org/doecsgf/docs/2022_DOE_CSGF_Longitudinal_Study_BRIEF-Web.pdf (2024)

Alumni Report of Benefits from DOE CSGF (2022)



Source: Krell Institute (2024)

Alumni (487/509) Employment

How should the CSGF evolve to ensure the best experience for students?

Key points

- Remarkable success to date in quality (e.g. satisfaction, career success, completion rate), program agility, and scalability of CSGF
- Robust longitudinal data collection and analysis allows measurements to guide evolution
- Efficient administration

Recommendation: Retain evolutionary approach; increase leverage of DOE lab resources; consider 6 areas for evolution:

Emerging Technologies Integration

Professional Development

Further strengthen Community Building

Expand Academic Institutional Reach

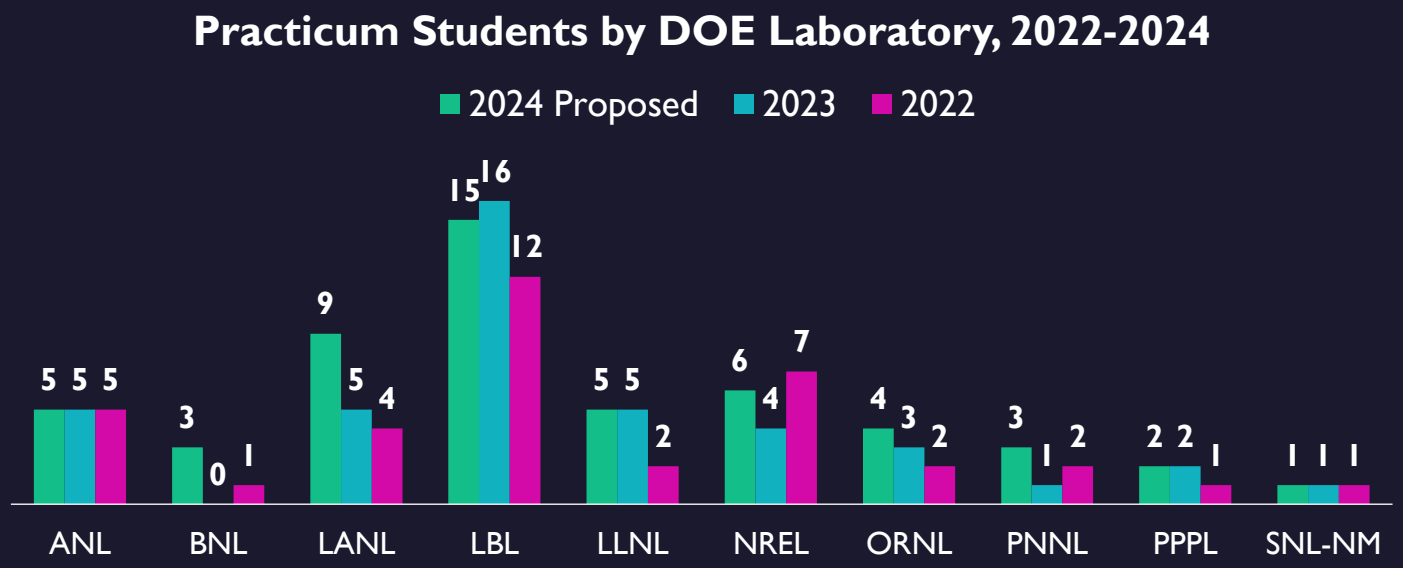
Enhance/coordinate Student Support Services

Adopt/adapt Program Evaluation Practices

Is there a unique role for CSGF in the landscape of federal graduate fellowship programs?

- There are at least 38 graduate fellowships encompassing computer science fields of study across industry, federal agencies, universities and non-profits.
- The majority of federal fellowships are focused more narrowly in computer science and engineering rather than inter/cross-disciplinary computational sciences
- **None offer the full set of defining benefits of the CSGF:**
  - **A yearly stipend of $45,000**
  - **Payment of full tuition**
  - **Up to four years of total support**
  - **A twelve-week practicum experience at one of 21 DOE national laboratories or sites, including access to DOE supercomputers**
  - **A rigorous program of study in a scientific or engineering discipline plus computer science and applied mathematics**
  - **An annual program review for fellows, alumni, university and DOE laboratory staff**
  - **An annual $1,000 professional development allowance**

Is the program appropriate tailored to support the computational scientist workforce needed at the DOE laboratories?



Source: FY2024 Cohort Report, Christine Chalk (2024)

- Program objective: *To help ensure an adequate supply of scientists and engineers appropriately trained to meet national workforce needs, including those of the DOE, in computational sciences.*
- Successfully achieved through: Interdisciplinary program of study; 12-week practicum at a DOE lab; community building; Annual Program Review meeting; strong mentoring
- *Example indicators that DOE Lab needs are being met:*
  - Fellows feel well-prepared for DOE career path
  - Program growth (23 fellows in 2014; 40 fellows in 2024)
  - *ASCR, NNSA* collaboration and joint funding
- **Recommendation for increased program growth**

What is the most effective governance model for the program?

- Governance is well-defined with appropriate program objectives
- Steering, Selection, and Screening Committees encompass appropriate scientific depth across industry, academia, lab and agency expertise
- Operational activities exhibit excellence (rigor, effectiveness, scalability, agility)
- Areas for improvement:
  - Lack of visible strategic plan/specific, measurable goals to achieving objectives
  - Limited evidence of strategic engagement with non-fellow stakeholders

Recommendation:

The subcommittee recommends that the CSGF program, with guidance from ASCR, and with greater input and broader participation from DOE labs, develop a five to ten-year strategic plan that addresses all four program objectives, including specific and measurable outcomes. The program should revise its governance bodies accordingly to prioritize greater stakeholder engagement while maintaining/improving efficiency and effectiveness of operations.

Increasing CSGF Excellence by Expanding the Nation's Capacity in Computational Sciences

Is the program attracting diverse applicants and making awards to diverse cohorts?

How can CSGF reach a broader applicant pool?

Is the program appropriately supporting students at institutions historically underrepresented in the federal research landscape?

- CSGF is pursuing expanded reach in applicant pool, academic institutions, national footprint, disciplines
- Rigorous CSGF data collection provides longitudinal analysis
- Significant effort with partial success in the past decade
- Additional effort required to address CSGF Objectives 1 and 2

Recommendation:

The subcommittee recommends that CSFG develops and communicates a comprehensive national talent outreach strategy to expand the fellowship pipeline by leveraging DOE Laboratory networks, targeted institutional partnerships, and strategic disciplinary recruitment to systematically identify and cultivate promising graduate student talent across diverse academic institutions and fields of study.

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Thank you

- ASCAC Chair Martin Berzins, DOE Designated Official Ceren Susut-Bennett, ASCAC POCs Christine Chalk and Tanner Crowder, ASCAC Cochair Roscoe Giles
- DOE CSGF Program Managers Christine Chalk, David Etim
- DOE CSGF PI Shelly Olsan, Co-PIs David Brown, Jeff Hittinger
- Current and former CSGF Steering, Selection, and Screening Committee Members
- ASCAC Subcommittee members