

Report of the  
**Committee of Visitors (COV)**  
For the **Basic Energy Sciences**  
**Scientific User Facilities Division**  
**(SUF)**  
to the  
**Basic Energy Sciences Advisory**  
**Committee (BESAC)**

**Review of Fiscal Years 2016, 2017, 2018**

**Rockville, Maryland**

**April 10-12, 2019**

# Summary

- A *Committee of Visitors (COV)*, under the guidance of the Basic Energy Sciences Advisory Committee (BESAC), reviewed the programs of the Scientific User Facilities (SUF) Division within the Department of Energy (DOE), Office of Basic Energy Sciences (BES) for the fiscal years (FY) 2016, 2017, and 2018. The COV was chaired by Prof. Anthony Rollett (Carnegie Mellon Univ.). Seventeen members of the committee met at the Rockville Hilton to review the management processes of SUF on April 10-12, 2019.

# Charge to the COV

The charge was to address the operations of the SUF Division during the fiscal years 2016, 2017, and 2018. The components of the Division that the COV was asked to review were:

- Light Sources including the Accelerator and Detector Research Program and Early Career Research Program,
- Neutron Sources including the Early Career Research Program,
- Nanoscale Science Research Centers including the Early Career Research Program, and
- Construction Projects.

The COV was asked to focus on the following major elements:

(1) For the scientific user facilities including the accelerator and detector program, assess the efficacy and quality of the processes used to:

- (a) solicit, review, recommend, and document proposal actions, and
- (b) monitor active projects, programs and facilities.

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

- (a) the breadth and depth of portfolio elements
- (b) the national and international standing of the portfolio elements
- (c) the preparedness to meet future challenges (e.g., instrumentation, data management and computation).

# Major Recommendations

- The current lean staffing for SUFD make planning for workload moderation and leadership succession important.
- SUFD (and BES in general) is encouraged to work with the Laboratories and facilities to improve workforce diversity at the user facilities. While most laboratories have implemented procedures for improving diversity, SUFD is encouraged to address cultural issues specific to facilities use.
- The Accelerator and Detector Research (ADR) program is highly effective and is important for the long-term development of the user facilities. All white papers should be entered into the Office of Science Portfolio Analysis and Management System (PAMS).
- The use and development of software analytical tools, high throughput hardware (e.g., robotics) and better support at existing instruments that will lead to significant improvements in facilities is encouraged.
- SUFD should find new ways to inform potential industrial users of how the user facilities can solve problems that standard tools cannot address.

# Committee Membership

- The COV membership was selected by the COV chair, Prof. Anthony Rollett, in consultation with the chair of BESAC and the Division leadership. The members were chosen to represent a cross-section of experts in scientific fields relevant to the activities supported by the SUF Division. A balance was achieved between academic (10), national laboratory (6), and industry (1) members; and between those that have previously served on a SUF COV and those that have not (3 and 14, respectively). Five of the committee members also serve on BESAC.
- Given the size of the Division and the breadth of programmatic areas, a sizable committee was assembled. The COV consisted of a total of 17 members and were divided among 4 panels.
- The following COV members served as the leaders for the Panels: Ben Feinberg (Construction Projects), Yan Gao (Light Sources/Accelerator and Detector Research), Despina Louca (Neutron Sources), and Cynthia Friend (Nanoscience Centers).
- **The Chair is grateful to the sub-committees and especially their Chairs for their intensive effort and wide-ranging discussions.**

# Process

- We began with an overview of the programs by the SUF program managers. Each panel was supplied with electronic files via PAMS or laptops to evaluate the SUF Division processes.
- For **grants**, proposals were distributed among four types of programmatic decisions: easy awards, easy declines, difficult awards, and difficult declines. The panels were free to request any additional materials (including folders for other proposals) or information that they felt would help them in their evaluation process.
- For the **facility operations**, the panels considered the triennial reviews and monthly status call materials. For construction projects, the panel reviewed documentation related to critical decision project reviews, status reviews, special reviews, monthly reports, conference call notes, and review presentations.
- This year the COV **also considered proposals** under two funding opportunity announcements: early career proposals across the SUF Division and quantum information science proposals for the nanoscience centers.
- An extended discussion with the whole committee was very useful for identifying common issues and arriving at a coherent result.

# Response to Charge

- (1a) Concerning the efficacy and quality of the processes used to solicit, review, recommend, and document proposal actions, the COV finds that SUFD's processes are effective and properly administered. The PAMS system is an important component of the system ...
- (1b) Concerning the efficacy and quality of the processes used to monitor ..., the COV finds SUFD performance to be outstanding with recent recognition providing external validation.
- (2a) Concerning how the award process has affected the ... portfolio elements, the COV finds that the process for Early Career Awards is contributing to advancement of several areas under SUFD. The COV discussed ... the small number of awards ... Understanding that each early career award represents a substantial financial commitment, the COV suggests that additional ... opportunities to junior staff for innovation.
- (2b) Concerning ... national and international standing, the COV found it challenging to identify objective evidence for benchmarking. The Committee understands that there will be a charge to BESAC to address this issue. It is also true that information is available on machine performance, user statistics and output, which could be included in COV and/or Triennial Review briefings.
- (2c) Concerning ... future challenges ..., the Committee finds that, in certain areas, the process has been outstandingly effective. The CAMERA is a particularly promising joint activity ...that partly arises out of the BESAC report on Mesoscale Science. The ADR ... is clearly important for long-term health ...

# Response to Charge, contd.

- **The Committee was pleased to find that the 2016 recommendations had been acted upon.** The increase in travel support for program directors from BES is commendable. However, it is important to ensure these resources provide the opportunity for all program directors to attend professional society meetings so that they engage the community and stay abreast of the developments as well as the challenges in their respective fields. Attendance at professional society meetings is also an important mechanism for the community to learn about the capabilities at the DOE user facilities. The inclusion of budget reviews in the triennial facility reviews has been implemented and appears to be a more efficient approach (by eliminating a separate budget review process). Speeding up the transmission of the review results to the facilities has occurred which is important for allowing the facilities to respond in a timely fashion. The use of best practices in enabling industry to make best use of the facilities is commendable.
- **The Committee commends SUFD for its effective leadership of its set of world-class user facilities,** the breadth of which is impressive and is a strongly distinctive feature of how BES supports science in the USA. The quality of the user facilities is evidenced by the large (and increasing) numbers of users, their positive evaluations and the high quality of their scientific output that often directly involves the beamline scientists.
- **SUFD has an effective set of systems and practices in place** that provide a transparent means of managing the user facilities.
- **The Triennial facility review process was found to be highly effective in all sectors.**



# Response to Charge, contd.

- Several facilities have overcome significant technical challenges on their path to full performance.
- The diversity of the user body appears to be similar to that in the physical sciences and engineering. The user facility staff and management, however, are noticeably less diverse.
- Recapitalization is an ever-present need and particularly so for the Nanoscale Science Research Centers. The Committee commends SUFD for the current effort and fully supports the case for seeking additional funds so as to meet the scientific challenges laid out in, e.g., recent BES reports.
- Expanded beamline internship opportunities for students and postdocs could increase the pipeline of new facility staff.
- The Committee commends the work of the light sources staff in planning for the data explosion that is coming because of, e.g., higher resolution, higher read-out rate detectors. There is also an opportunity for all the user facilities to provide leadership in data reproducibility, data reliability, data transparency and ways to efficiently turn raw data into information.
- The information that the COV needed to conduct the review was readily available. The combination of PAMS (for viewing proposals and related documents) with the laptops (for, e.g., Triennial Reviews) provided efficient access. BES staff made themselves available for discussion on a regular basis, which was very helpful. It was, however, difficult to find information on performance metrics for the instruments (beamlines).

# Wrap-up

- Profound thanks to all the members of the COV, especially the sub-committee chairs.
- Profound thanks to all members of the SUF most especially to those who answered all our questions, provided logistical support and helped it to go smoothly.
- The COV was glad to provide peer review of a vital component of the national scientific and technological enterprise.

# Back up slides

# Construction

- Work with the Office of Project Assessment to develop an Office of Science project-wide searchable database for Lessons Learned, using the Lessons Learned reports required of the projects.
- If project data beyond mandated metrics are needed, provide consistent templates and/or examples.

# Light Sources + Accelerator and Detector Research

- Continue the optimization of the triennial reviews as they are important activities. For example, there could be a discussion with the facility directors of what is viewed as least efficient and what is currently missing.
- Continue to reduce the time between the review date and the report to the facilities.
- Specific ideas for recruitment and career development at the BES light sources:
  - Manage the workload to provide a certain percentage of “release time” for scientific staff (from aiding users) and funding for equipment ...; Clearly define staff roles, responsibilities, and career opportunities ...; Provide guidance and training to staff on pursuing funding opportunities ...; Provide opportunities for staff to mentor postdocs, graduate students ...

# Neutron Sources

- The committee recommends that BES pursue interagency collaboration in support of the U.S. neutron scattering community.
- Another recommendation from the previous COV was to be mindful of how facility transitions ... can affect the ... user community and productivity.
  - The committee feels that BES is mindful of the user community and [has] responded ...
- It is suggested that the most effective metrics for evaluation of facility operations and instrument performance be highlighted during future triennial reviews ...
- ... there could be more effective communication with the scientific community to help direct Early Career proposals.
- Encourage Early Career applications that tackle the development of new data analysis methods ...

# Neutron Sources, part 2

- Continue to include at least one member of the triennial review committee on the COV ...
- Identify and provide metrics for peer-facility comparison and evaluation ...
- Data storage, reduction, and analysis should be treated as an integral part of new technique development and instrument commissioning ...
- Data scientists should be embedded within research groups ...
- DOE should take a more active role in encouraging diversity ...
- Projects involving automation and high throughput on instruments should be prioritized ...
- More transparency is recommended regarding the down selection of the early career proposals that are either rejected or awarded ...

# Nanoscience Centers

- Triennial reviews should evaluate FAIR† principles of data accessibility to assure that NSRCs establish state-of-the-art practices.
- Triennial reviews should evaluate NSRC workforce diversity achievements and plans.
- Reviewers should be selected from a balance of backgrounds uniformly across the 5 NSRCs.
- BES should utilize recapitalization efforts to refine the strategic directions and further differentiate the 5 NSRCs.