

**REPORT TO THE BIOLOGICAL AND ENVIRONMENTAL
RESEARCH ADVISORY COMMITTEE (BERAC)**

by

**THE COMMITTEE OF VISITORS FOR THE REVIEW OF
THE BIOLOGICAL SYSTEMS SCIENCE DIVISION**

Review of Fiscal Years 2017, 2018, 2019, and 2020

February 4, 2022

Table of Contents

[I. Executive Summary](#)

[II. Introduction](#)

[III. Summary of the COV process](#)

[The charge of the COV](#)

[COV membership](#)

[The COV review process](#)

[Recommendations](#)

[IV. Portfolio-wide issues](#)

[Staff needs and considerations](#)

[Recommendations](#)

[Scientific community engagement and outreach](#)

[Recommendations](#)

[Review process](#)

[Recommendations](#)

[Portfolio balance and coordination](#)

[Recommendations](#)

[Diversity, equity and inclusion](#)

[Recommendations](#)

[V. Programs supported through Funding Opportunity Announcements](#)

[Recommendations](#)

[VI. Bioenergy Research Center program](#)

[Recommendations](#)

[VII. National Lab Project and Science Focus Area programs](#)

[Overview](#)

[Processes for making awards](#)

[Processes to monitor active awards, projects, and programs](#)

[Quality of the portfolio](#)

[Recommendations](#)

[VIII. Enabling capabilities](#)

[National Microbiome Data Collaborative \(NMDC\)](#)

[Recommendations](#)

[Cryo-EM facilities](#)

[Recommendations](#)

[Joint Genome Institute](#)

[Recommendations](#)

[DOE Knowledge Base \(KBase\)](#)

[Recommendations](#)

[BSSD-sponsored user facilities](#)
[Recommendations](#)

[Appendix A: COV charge letter](#)

[Appendix B: COV members and responsibilities](#)

[Appendix C: COV agenda](#)

[Appendix D: BSSD staff members](#)

I. Executive Summary

A Committee of Visitors (COV) with 16 members met July 27-29, 2021, to evaluate the DOE Biological Systems Science Division (BSSD) portfolio, which totaled \$405M in FY2020. The review covered programs active during FY2017-FY2020, with subcommittees reviewing the processes involved in funding university research, national laboratory programs, Bioenergy Research Centers, and enabling capabilities such as beamlines and the Joint Genome Institute. Overall, the COV found that the processes for soliciting, reviewing, and monitoring projects were good to excellent. BSSD has succeeded in funding a broad portfolio that generates high-impact scientific outcomes relevant for the division mission to study biological processes that underpin the nation's energy security. The COV appreciated the high degree of clarity and transparency in the Funding Opportunity Announcement mechanism that supports university research grants. There was less consistency in review standards and transparency for some complex enabling capabilities and national laboratory programs. Still, the COV appreciates the efforts of program managers to meet the challenge of standardizing practices and optimizing outcomes across national laboratories and facilities at a range of scales. This report contains many specific recommendations to help address these challenges.

Cross-cutting recommendations synthesized by the COV include the following:

1. DOE should strive to provide annual budget allocations in a timely manner and increase program management and administrative staff to match recent changes in portfolio size, scope, and complexity.
2. Preferably at the agency-wide level, DOE needs to address diversity, equity, and inclusion through demographic data collection and the implementation of policies and practices that support a diverse community of scientific innovators.
3. At the Division level and higher, DOE should clarify the role of education and outreach in its mission while promoting greater inclusion of junior and new investigators by helping them navigate DOE funding mechanisms.
4. Develop standardized metrics for evaluating portfolio elements to guide strategic decisions and provide more information about research directions, such as when to sunset large projects because funding priorities have changed.
5. Develop proactive structures to increase the level of transparency in decision-making and community engagement when responding to needs or opportunities that arise suddenly, such as congressional mandates.
6. Clarify merit review criteria across programs and justify eligibility of universities versus national labs for different funding mechanisms in the solicitation documents.
7. Maximize the value and comparability of reviewer ratings by developing more detailed scoring rubrics and providing consistent guidance to reviewers on evaluating merit review criteria.
8. Create mechanisms and require sustainability plans to scale up and disseminate promising new technologies developed with program funding.
9. Increase the strategic oversight of JGI's programmatic scope and direction.

II. Introduction

This report documents the findings from a Committee of Visitors (COV) that was assembled under the charge of the Biological and Environmental Research Advisory Committee (BERAC) to evaluate BSSD processes and programs. Due to the ongoing COVID-19 pandemic, the COV was delayed from 2020 to 2021, thus covering four fiscal years instead of the traditional three. The COV met virtually through Zoom for three days from July 27-29, 2021. This COV was the fourth in the series for BSSD, starting in June 2011, with subsequent reviews in 2014 and 2017. Every attempt was made to keep the overall agenda as similar as possible to those of previous, in-person COVs; however, some changes were necessary due to the virtual nature required by COVID-19 restrictions.

Through its support of fundamental scientific research, BSSD's overall strategic goal is to understand, predict, manipulate, and design biological processes that underpin innovations in bioenergy and bioproducts, including understanding of natural environmental processes relevant to DOE. Under this goal, BSSD-supported research addresses plant and microbial systems at scales from genomes to ecosystems. Funding for computational resources, visualization techniques, and molecular characterization, largely through DOE user facilities, supports university and national laboratory researchers in achieving the BSSD mission.

In FY2020, BSSD's total budget was \$405M. The largest funding allocation was to Genomic Science at \$268M, with \$100M of that allocated to four Bioenergy Research Centers (BRCs). \$77M supported Biological Systems Facilities and Infrastructure through the Joint Genome Institute (JGI), and \$45M was allocated to Biomolecular Characterization and Imaging Science. The remaining \$14M supported SBIR/STTR programs.

BSSD funds are distributed through programs targeting universities, national laboratories, and enabling capabilities. Funding opportunity announcements (FOAs) and BRCs are the main funding mechanisms for university research. National lab research is supported through Science Focus Area (SFA) programs and National Lab Projects. Funding for enabling capabilities flows through JGI, the DOE Systems Biology Knowledgebase (KBase), the National Microbiome Data Collaborative (NMDC), cryoEM facilities, synchrotron light and neutron sources, and small equipment programs. There is also an open solicitation used primarily to fund conferences and workshops.

III. Summary of the COV process

The charge of the COV

On October 25, 2019, Dr. Chris Fall, then Director of the Office of Science, charged BERAC with assembling a COV to assess the processes used to create and manage the research portfolio in BSSD during fiscal years 2017, 2018, and 2019. The letter is attached as Appendix A. Because of the postponement to 2021 due to the COVID-19 pandemic, this review also includes fiscal year 2020. The components of the Division that the COV was asked to review were:

1. National Laboratory Scientific Focus (SFA) programs and projects

2. Funding Opportunity Announcement (FOA) grants
3. User Facilities: JGI and structural biology resources

The COV was asked to focus on the following major considerations: (i) assess the efficacy and quality of the processes used to solicit, review, recommend, and document proposal actions and monitor active projects; (ii) within the boundaries defined by the DOE missions and available funding, comment on how the award process has affected the breadth and depth of portfolio elements, and the national and international standing of the portfolio elements; and (iii) assess the division's management and oversight of the JGI user facility, including facility operations tracking and review, user proposal solicitation, review, and recommendation procedures.

COV membership

The COV membership was selected by the COV Chair, Dr. Steven Allison, in consultation with BER staff. The members were chosen to represent a cross-section of experts in the scientific fields relevant to the activities supported by BSSD. A balance was achieved among the following factors: researchers who currently receive funding from BER and those that do not (11 and 5, respectively); researchers from academia (7), national labs (4), other Federal agencies (3), the private sector (1), and spanning both academia and national labs (1); and researchers who have previously served on a COV versus those who have not (3 and 13, respectively).

A full listing of the COV members and their panel assignments is given in Appendix B. The COV consisted of 16 members, including the Chair. Three subcommittees were formed, each with five members, including a subcommittee leader. The subcommittees focused on FOA-funded university programs, National Lab programs, and Enabling Capabilities, respectively. Within the FOA subcommittee, a designated co-leader focused on the BRC program due to its large scope. COV members reviewed program background information, proposal review materials, award progress reports, and program funding summaries to make their assessments.

The COV review process

The COV assembled online in a Zoom meeting on Tuesday, July 27, at 12:00pm EDT and adjourned at 5:00pm EDT on Thursday, July 29, 2021. The agenda for the COV is attached as Appendix C. Prior to convening online, each COV member was supplied with a link to access the BSSD COV in the Office of Science's Portfolio Analysis and Management System (PAMS) that included a comprehensive set of background information on funding programs. Additional information was also supplied to each COV member during the Zoom meeting, including funding summaries and other materials not available through PAMS. On July 12, 2021, COV members were invited to attend a one-hour Zoom session that provided an introduction to PAMS, Kiteworks, and other processes that they would need to navigate the review process.

The COV began on July 27, 2021, with presentations by Dr. Sharlene Weatherwax, Associate Director of BER, who welcomed the committee and presented an overview of BER, followed by an overview of BSSD by Division Director Todd Anderson. COV Chair Steven Allison reiterated the charge to the committee given by Dr. Chris Fall, Director of the Office of Science. Panel members were then presented with further details on the overall review process, schedule, and PAMS by Dr. Dawn Adin. This opening session was followed by BSSD staff (Appendix D)

providing short presentations on specific programs. The COV members then divided into breakout rooms by subcommittee where program-specific presentations were given.

COV activities focused on reviewing files, synthesizing information, and reporting out from subcommittees. Proposals that were on the borderline for funding or that showed substantial deviations between reviewer rankings and funding recommendations were selected for more detailed scrutiny. On average, at least five proposals from each program were selected for more detailed review by the COV. The Enabling Capabilities subcommittee was tasked with reviewing 28 enabling facilities that were grouped into new programs (cryoEM facilities and the NMDC) and existing programs (synchrotron and neutron facilities, KBase, and JGI). Subcommittees discussed their preliminary conclusions with the entire COV and BSSD staff during executive sessions on the afternoons of July 28 and 29, 2021. Notes from these discussions and the subcommittees were compiled to draft this report.

Recommendations

1. The COV recognized that review and monitoring processes are robust and standardized across BSSD. Still, the COV found it difficult to access some key documents such as progress reports, program manager review summaries, and recommendations. The COV had the following suggestions for making documents more easily accessible in PAMS and KiteWorks:
 - a. Provide a single README document (i.e., find proposals in PAMS, go to KiteWorks to find funding summaries).
 - b. Use a consistent terminology when naming documents uploaded into PAMS.
 - c. Request biosketches from reviewers and panelists and provide those to the COV to assess reviewer expertise.
 - d. Improve the organization of review materials into one site to facilitate the COV work.
 - e. Provide most of the non-confidential background information as a packet prior to the COV. Each program manager could then provide just a brief introduction during the presentation on day 1 of the COV.
2. Develop, calculate, and share with the COV longer-term metrics of program impact beyond the COV review period, such as the number of proposals submitted per FOA, the number and citation impact of publications per unit time and per dollar, and the average award size and duration to universities, SFAs, user facilities, and BRCs.

IV. Portfolio-wide issues

Staff needs and considerations

Having adequate personnel is a key part of ensuring fairness, transparency, and quality in the BSSD portfolio. Currently, the division employs 11 program managers after adding several new individuals to replace recent retirements. The program managers shared that although they are currently capable of accomplishing key tasks, recent growth in the portfolio, specifically in bioenergy and biodesign, is generating a higher workload than is sustainable in the long run. Program managers are also expected to perform duties that fall outside the direct management of the BSSD portfolio, such as coordination of SBIR, graduate fellowship, and interagency

efforts. Together, these responsibilities limit the time available for program managers to review and synthesize the scientific outcomes from the portfolio, activities that are crucial for achieving the BSSD strategic mission in the long run. The program managers also noted that delays in the budgeting process that compress the FOA timeline are very stressful to manage and frustrate the scientific community along with BSSD personnel.

Recommendations

1. To ensure program managers have sufficient time to manage new directions and engage with the scientific outcomes of the portfolio, the COV recommends adding up to 3 program managers in the division, particularly in the domain of bioenergy. BSSD recently hired a new administrative assistant, but growth in the portfolio warrants an additional hire for program administration, especially if additional staff are needed to support diversity, equity, and inclusion efforts.
2. Whenever possible within the constraints of the federal budget process, DOE administration should strive to provide timely budget guidance to BSSD to avoid compressed timelines in FOA release and response by applicants.
3. The previous COV noted that program managers had insufficient resources for travel and conference attendance to keep apprised of cutting-edge scientific research related to the portfolio. This COV was pleased to hear that funding for conference travel was increased prior to COVID, and we recommend prioritizing support for conference and workshop participation going forward.

Scientific community engagement and outreach

Deserved or not, DOE has a reputation for being somewhat exclusive, likely due to the mission-driven nature of the agency. For new investigators in particular, it can be challenging to understand BSSD culture, review processes, funding opportunities, and professional networks. Once a researcher obtains BSSD funding, there are many opportunities to engage with the program through PI meetings and workshops, but other programs within the division may remain a mystery to funded investigators. Also, some DOE funding arises quickly from congressional mandates or high-level agency decisions, making it difficult for researchers to take full advantage of these opportunities in both university and national lab settings.

In general, the COV found that expectations for education and outreach efforts beyond the scientific community were unclear across the BSSD portfolio. As education and outreach are not currently a main focus in the DOE mission, many programs made no mention of these activities in funding calls. Others, such as the BRC program, do mention education and outreach, but the criteria for assessing these activities were not clear. Education and outreach could be considered important for the DOE mission to “prioritize scientific innovation”; “create a vibrant scientific ecosystem”; and “keep America in the forefront of discovery and innovation”.

Recommendations

1. Researchers in the BSSD domain would benefit from training programs (e.g. workshops, webinars) focused on funding opportunities and proposal preparation. Such programs, especially if targeted at new investigators (or those new to DOE), would improve the quality and appropriateness of proposals received, ultimately increasing the breadth and

quality of the portfolio. Even among funded investigators, workshops and training programs could help better align researcher expertise with programmatic goals. The COV thought this approach would be particularly beneficial for BRC FOAs where new project proposals appear to be at a disadvantage relative to renewal proposals backed by 5 or more years of experience.

2. BSSD, and perhaps the entire agency, should clarify the role of education and outreach in the context of the DOE mission. The COV is not recommending duplication of NSF efforts on broader impacts, but DOE should develop and implement its own practices to build a diverse, informed, and successful community of researchers focused on the agency mission. At a minimum, there should be sufficient engagement with the community of eligible researchers in the BSSD domain to ensure a robust flow of high-quality proposals to university and national lab programs. Furthermore, BSSD should strive to increase the diversity and breadth of researchers who compete for and receive DOE funding at universities and national labs.
3. BSSD should consider requiring that proposals include plans for technical and human resource development (mentoring, training, retention) and that annual progress reports contain a summary of scientific, societal, outreach, and training impacts achieved during the review period. This information could facilitate the tracking, assessment, and promotion of societal impacts of BER-funded research by future COVs and BSSD.

Review process

The facilities supported by the DOE need to have a sense of stability, and BER must carefully balance oversight with the time constraints facing investigators. Indeed, each month spent writing reports and revising science plans likely results in one less publication.

The COV found that some enabling capabilities programs had less documentation and transparency about funding recommendations compared to other areas of the portfolio. For instance, there was no documentation of declined proposals associated with the NMDC, suggesting that a competitive evaluation process was not used to fund this program.

Some infrastructure must be stable over decades and require investment that assures sustained operation. However, technology changes, often at an unpredictable pace, and thus new ventures arise that could fill critical research gaps. For several user facilities, the processes for adding and removing capabilities are unclear. BSSD's strategy on funding these potential opportunities is not well defined.

For ongoing, multi-year projects, the lack of continuity of reviewing from one period to the next is concerning. Reviewers may not see previous progress reports or reviews.

With the COVID pandemic, all review panels after March 2020 were held virtually. There was little evidence that virtual panels or site visits compromised the review process in any way. Program managers and the COV recognized that the virtual format could be more inclusive because it allows participation by reviewers who face barriers to travel, such as time constraints and family care obligations. Costs for virtual panels are also lower. One potential downside is that personal interactions and non-verbal communications are limited during virtual discussions.

Also, there are limited opportunities for networking and spontaneous intellectual discourse among panelists and program managers.

Recommendations

1. There should be a documented process for making strategic funding decisions about new enabling capabilities. This process should improve transparency about which teams are approached for funding opportunities to develop new capabilities.
2. The COV recommends developing a policy for sunseting large projects if they are no longer serving the needs of the scientific community. This policy may require the establishment of quantifiable metrics to determine the success of ongoing, multi-year projects. Resource allocation should be based, at least in part, on these metrics.
3. Make previous reviews, or review summaries, available to current reviewers of long-term projects.
4. Encourage user facilities to avoid redundancy in capabilities while meeting user community demand. Facilities should also focus more on helping users with downstream data analysis, especially for highly specialized techniques.
5. Require that facilities managing databases ensure fidelity. For example, the quality of entries in the Protein Data Bank should be curated more rigorously. Metrics and policies should emphasize that quality is more important than quantity.

Portfolio balance and coordination

Maintaining portfolio breadth requires balancing resources across university-focused programs, national labs, and user facilities. All three areas are important to maintain a diverse research portfolio that includes small teams (mainly at universities), larger teams (e.g., national lab SFAs), integrative centers (i.e. BRCs), and technical capabilities that serve the entire scientific community. Over the review period, the percentage of BSSD funding allocated to university-led research has ranged from 28% to 36%, most recently 29% in FY2020. There is no specific target allocation, and year-to-year variation is expected based on shifting programmatic and budgetary factors.

Coordination within the BSSD portfolio is excellent. The COV was impressed that all program managers participate in all funding recommendations across the division. This participation keeps program managers informed about portfolio elements outside their immediate domain and enhances synergy across the portfolio.

The BRC and university investigators' relationship is considerably more efficiently organized and established with JGI compared to other enabling capabilities, including EMSL, KBase, and synchrotron facilities. Moreover, 30% of JGI capacity is set aside for the BRCs. Program managers recognize the perceived barriers for users especially with KBase and the synchrotrons and have addressed some challenges since the last COV review.

External coordination is good. The program managers participate frequently in discussions across agencies such as NIH and USDA. A recent joint DOE-USDA Plant Feedstocks program was viewed as a success, and the research community was disappointed that it was discontinued. Program managers also coordinate across the DOE Office of Science, particularly with programs such as ARPA-E and EERE. There could be better coordination with the BER

sister division of Earth and Environmental System Science, particularly for the Environmental Microbiome Science program, and between the NMDC and ESS-DIVE. Funding calls list opportunities for investigators to leverage multiple DOE resources such as EMSL, JGI, and NERSC.

Recommendations

1. The COV recommends that a list of metrics be provided to aid COVs and BSSD in assessing the impact of portfolio elements. The metrics could include publications, but also additional information such as outcomes for public outreach, training, and mentoring.
2. Stronger coordination with EESSD is needed, given its close intellectual proximity to BSSD within BER. The COV recommends the creation of explicit funding opportunities that promote integration between the genomic scales typical of BSSD and the ecosystem to global scales of EESSD. Clearer guidelines are needed to help investigators choose among BER data repositories (i.e. NMDC vs. ESS-DIVE).
3. Outreach efforts, workshops, and funding opportunities should be tailored to enable greater integration, efficiency, and communication across user facilities and funding mechanisms.

Diversity, equity and inclusion

The COV finds diversity, equity, and inclusion to be crucial for accomplishing the DOE and BSSD mission. Including researchers from diverse backgrounds leads to faster and more socially-just innovation because more thought leaders with diverse knowledge sets, identities, and perspectives are involved in advancing scientific goals. Moreover, principles of equity ensure that researchers from different backgrounds have the same opportunities to engage with the BSSD community, compete for funding, and conduct research.

The COV was convinced that the program managers have a genuine commitment to increasing diversity, equity, and inclusion. They have in some cases implemented specific practices to promote these principles. At the same time, program staff are extremely limited in the tools they have available to assess and increase diversity, equity, and inclusion. There is no consistent collection of demographic data by DOE to monitor progress or impacts of diversity-focused policies or practices. Program managers are in a difficult position of trying to infer demographic data from publicly available information that may not accurately reflect gender, racial, ethnic, and other underrepresented identities.

Based on the data available and inferences by the COV about gender from names commonly perceived as gender-specific, the representation of women in BSSD programs is low. Only 26% of grant proposals submitted to FOAs and 24% of funded proposals were led by PIs assumed to be women. Only one BRC submission was led by a presumed woman, and the proposal was not funded. For the review process, the percentage of presumed women asked to be reviewers ranged from 13% to 48% with an average of 36%. The COV was concerned about the substantial discrepancy between the proportion of women being asked to serve the division as reviewers (36%) versus the proportion receiving funding from the division as lead investigators (24%). These data suggest that women viewed as expert reviewers are underrepresented in the

BSSD community and the proportion of women funded is lower still. No data was available to the committee on other metrics of PI or reviewer diversity (e.g. racial or ethnic background).

Recommendations

1. DOE should implement a procedure to systematically collect anonymized demographic data for all reviewers, panelists, investigators, and workshop participants engaged in BSSD activities. Aggregated demographic data should be made publicly available on an annual basis.
2. DOE should provide resources for program managers to implement best practices to increase diversity, equity, and inclusion across the portfolio. Such practices could include 1) scientific, training, and planning workshops supported by DOE and targeted at groups who are underrepresented in the BSSD funding portfolio; 2) direct outreach from program managers to communities serving underrepresented investigators through conferences, PI meetings, and workshops; and 3) professional development programs to build an inclusive community and promote the success of underrepresented investigators pre- and post-award.
3. Hire experts into the agency or contract with outside experts to facilitate implementation of specific practices that promote diversity, equity, and inclusion.
4. In line with recent actions by other federal agencies, develop policies and procedures for sanctioning DOE-funded investigators found guilty of misconduct, including sexual harassment, discrimination, and scientific misconduct.

V. Programs supported through Funding Opportunity Announcements

This review comprised ten FOAs in the areas of Feedstocks, Genomics and Computational Biology, Systems Biology, and Imaging. About 30% of the division's funding is allocated to the academic community through the FOA process. Over 400 applications were submitted to these ten FOAs.

1. DE-FOA-0001650, Biosystems Design to Enable Next-Generation Biofuels (FY17)
2. DE-FOA-0001688, Plant Feedstocks Genomics for Bioenergy: A Joint Research Funding Opportunity Announcement with USDA (FY17)
3. DE-FOA-0001857, Plant Feedstocks Genomics for Bioenergy: A Joint Research Funding Opportunity Announcement with USDA (FY18)
4. DE-FOA-0002060, Genomics-Enabled Plant Biology for Determination of Gene Function (FY19)
5. DE-FOA-0002217, Computational Tool Development For Integrative Systems Biology Data Analysis (FY20)
6. DE-FOA-0001865, Systems Biology of Bioenergy-Relevant Microbes to Enable Production of Next-Generation Biofuels and Bioproducts (FY18)
7. DE-FOA-0002059, Systems Biology Enabled Research on the Roles of Microbiomes in Nutrient Cycling Processes (FY19)
8. DE-FOA-0002214, Systems Biology Research to Advance Sustainable Bioenergy Crop Development (FY20)

9. DE-FOA-0001868, Bioimaging Research and Approaches for Bioenergy (FY18)
10. DE-FOA-0002041, New Bioimaging Approaches for Bioenergy (FY19)

The subcommittee found that the FOAs were consistent and well aligned with the mission of BSSD. However, aside from DE-FOA-0001650 and DE-FOA-0001865, the FOAs did not contain requirements for proposals to address biosafety, biohazards, or biocontainment. There was also no mention of diversity, equity, or inclusion.

In addition to examining the FOA content, the review process was carefully evaluated. The subcommittee reviewed funding rates, evaluated how the decisions were made to fund or not fund proposals by reading reviews of about 25% of the funded and unfunded proposals, and estimated the gender balance of various aspects of the application and review process.

The preapplication process generally works well overall. The percentage of applications encouraged vs. preapplications submitted was somewhat variable between the different FOAs, which may have been due to the amount of funding for each FOA and the number of preapplications submitted. In a few cases, the preapplication decisions could be made more strategically. In addition, the small number of program managers coupled with the large number of submissions makes it difficult to scrutinize all the preapplications.

Each full proposal received 3-4 reviews from the panel members with a few ad hoc reviews for a limited number of proposals. Reviews were generally consistent with the rankings/scores but were very reviewer dependent. In some cases high scoring proposals were declined for funding, but in most instances here, the program manager provided a sound justification in the special consideration section of the funding summary. The FOAs encourage the submission of high-risk/high-reward applications that address critical knowledge gaps with potential for high impact science. This practice is highly commendable and will push forward the boundaries of scientific knowledge. The outcomes of the awarded proposals were not evaluated because that information was not provided.

Recommendations

1. Encourage more standardized reviews with additional specific questions for reviewers listed in each merit review section. Scores for each section rather than only a single score may provide a more objective scoring method. A similar recommendation was made by the 2017 COV, and their report contains additional suggestions for implementation.
2. Develop plans to address sustainability of FOA-funded technology after the funding period. Suggestions include: 1) encourage commercialization of the technique through I-CORPS, SBIR or other mechanisms; and 2) develop two phases of the FOA where the first phase would focus on development and the second phase would focus on making the technology available through university or DOE user facilities.
3. Establish a target for funding rate. Current rates vary which may in part reflect the stringency of screening done at the preproposal level. More stringent screening at the preproposal level would achieve higher funded proposal rates, as mentioned by the prior COV.

4. Create more opportunities for early career investigators such as postdocs and untenured researchers to become leaders in BSSD fields. Postdoc fellowships, new investigator grants, and transition grants (e.g. NIH's K99) are powerful examples used by other agencies. It was also noted that DOE stands to benefit from such a program by supporting a next generation of scientists that would have expertise particularly germane to the BSSD mission.
5. Increase the visibility of FOA programs in the scientific community to promote the DOE mission to a wider audience, increase the diversity of the applicant pool, and increase transparency. Advertising outlets could include scientific society newsletters, websites, journals, program manager office hours to answer questions about FOAs, and organizing workshops on the FOA application and evaluation processes.
6. To promote environmental health, safety, and risk management in tandem with advances in plant-based, fungal, and microbial genomics challenges, FOA language should require compliance with *Federal Experts Security Advisory Panel Guidance for Ensuring Institutional Compliance with Biosafety, Biocontainment, and Laboratory Biosecurity Regulations and Guidelines*.
7. Conduct more rigorous and transparent evaluation of projects responding to the open solicitation and determine whether BSSD should expand its use to invest in emerging fields, approaches, and technologies that may not fit well into existing FOAs.
8. As suggested by a prior COV, design objective metrics to assess how high risk/reward proposals have performed relative to others.

VI. Bioenergy Research Center program

Evaluation of the BRC program covered the review process for the FOA issued in 2016 (0001540) and the impact and standing of funded projects. Although the FOA was released in 2016, the funding was awarded in FY2018, so the FOA falls under the purview of the current COV. Expectations for all aspects of the program were clear in the FOA with the exception of education and outreach. In general, the processes used for proposal selection (solicitation, review, recommendation, documentation of process) were very good to excellent. The monitoring of active programs was also very well done and well documented. The impact of the BRC portfolio is outstanding based on the high number of publications coming from the research teams, the high impact of their publications, the collaboration nationally and internationally, numbers of patents, company spin-offs, and transfer of technology. The ten year retrospective (2007-2017) was an effective mechanism to share highlights and to evaluate the progress of all the centers.

The COV found that having the same review criteria for new and existing BRCs was problematic. Under this system, existing BRCs have an advantage due to their prior experience, making it difficult to maintain fairness in the proposal rankings. Based on the proposals for new centers, many groups would have benefitted from a mechanism to help them prepare for writing a BRC proposal. Currently, there is no process in place for this.

The retrospective and other public-facing reports highlight important education and outreach efforts, although the role of these activities is not clearly defined in the BRC program goals. In

the FOA and instructions to reviewers, the COV did find language about education and outreach within the merit review criteria (Section V - APPLICATION REVIEW INFORMATION).

Specifically, the language asks “Are the applicant’s plans for education, outreach and training in the proposed Center appropriate?” but this question is awkwardly placed under review criterion 2b, “appropriateness of the proposed method or approach”.

Recommendations

1. As with the other FOAs, the COV recommends additional structure be provided to BRC reviewers to ensure high quality reviews because the topics emphasized were inconsistent across reviews.
2. Education and outreach should be more broadly and intentionally emphasized in the BRC FOA and review process because these centers include students and postdocs that will require mentoring and training to reach their full potential as productive scientists. Expectations should be defined for education and outreach activities and outcomes, along with a mechanism of evaluation.
3. The COV recommends evaluating renewal of existing BRCs separate from proposals for new centers. There should be separate specific, transparent, and rigorous criteria for renewals; new proposals should not be expected to compete directly with renewals.
4. The COV recommends that BSSD develop a planning grant program (e.g. grants of <\$50K over one year) to support investigators in preparing BRC proposals. A community-facing workshop to help investigators prepare more competitive proposals should also be considered.

VII. National Lab Project and Science Focus Area programs

Overview

The Lab Project and SFA programs were initiated in 2007 to provide funding to the DOE national laboratories to carry out integrative and collaborative projects in support of BER strategic goals. A COV subcommittee reviewed new funding calls, review and processing of proposals as well as the management of a total of 37 short-term Lab Projects, SFAs, and longer-term funded projects that were either initiated or sunset during fiscal years 2017-2020.

Short-term projects focus on developing a specific technical capability or research goal with a defined endpoint. In addition, short-term projects may be used to initiate a research program that may develop into a longer-term funded project. In FY 2014, five pilot projects were initiated at national laboratories to develop in situ, dynamic, and non-destructive approaches to multi-functional imaging, quantitative flux measurements, and multi-scale integrative analysis of complex biological systems. These projects preceded a longer-term technology development program in Bioimaging through the national laboratories and a competitive FOA (DE-FOA-0001192) in FY 2014. Related National Lab Projects were funded through mechanisms announced in 2018 – “Bioimaging Research and Approaches for Bioenergy and the Environment” and most recently in 2020 - “New Quantum Enabled Bioimaging and Sensing Approaches for Bioenergy”.

By contrast, SFAs and longer-term projects draw on the distinctive strengths of each national laboratory to support collaborative, coordinated, and sustained research that complements research conducted at universities, research institutes, and the public sector. During the review period, two SFA funding opportunities were announced in the areas of “Soil Microbiome, Plant Research, and Biodesign” and “Secure Biosystems Design”. A total of 17 ongoing and newly funded SFAs were reviewed by the COV.

Processes for making awards

In response to new short-term and SFA research funding opportunities, a national laboratory submits either a white paper or Program Plan, respectively, that describes the proposed project, its overall goals and approaches, and its relevance to BSSD’s mission. Both types of pre-proposals are internally reviewed by BSSD staff for relevance and programmatic balance within the current BSSD portfolio. Upon completion of internal review, BSSD staff communicate whether submission of a full proposal is encouraged. However, the COV notes that the process by which awards were made was not always clear for the short-term funding opportunities.

Competitive panel review is used to assess full proposals submitted to both programs with one exception. To respond to Congressional mandates with short-turnarounds, the BSSD uses internal review of submitted white papers for short-term projects with the expectation that peer review will be used to assess progress at a later date.

In general, the COV was impressed by the processes used by BSSD to solicit, review, and recommend award actions for national lab proposals. The mechanisms for developing funding calls provided clear guidance to applicants and were consistent with Division priorities. The merit review criteria were clearly stated in most of these documents. The COV appreciated the quality of the reviews which were detailed and substantive; the appropriateness of the panelists selected for both reverse site visits and competitive panel review; and the detailed assessments by BSSD staff leading to funding recommendations. The COV appreciated that all BSSD staff are involved in funding discussions which leads to high-quality feedback on proposal outcomes.

In some cases, merit review criteria were not clearly described or easy to find in the SFA funding calls. For example, merit review criteria are described in very general terms in the 2020 call on Secure Biosystems Design and in the 2017 new SFA call on topics covering Plant Biology for Bioenergy, Biosystems Design for Bioenergy, and Soil Microbiome Research. To access specific details, proposers are directed to a separate document entitled ‘Managing BER Scientific Focus Area (SFA) Programs at the DOE National Laboratories’. By contrast, for FOAs, merit review criteria are described clearly in a dedicated section. It is likely that national lab staff understand how the process works, but this is not transparent to academic researchers and the external scientific community who often question why only national labs are eligible to apply for SFA funding, especially for broad calls like the FY2017 new SFA program which covered several different topic areas.

As noted by the previous COV, the number of pre-proposals (i.e., white papers, Program Plans) invited for full submissions continues to be higher than expected. It is possible that high success rates are due to robust and extensive pre-screening of proposals by national lab staff prior to

submission. Still, screening of pre-proposals is internal, and the transparency of the process continues to be a concern.

Processes to monitor active awards, projects, and programs

Monitoring of SFAs and Lab Projects is carried out through annual progress reports. SFAs are also subject to triennial reviews, although the COV noted that SFAs were originally intended to be 5-year projects. The triennial review has resulted in an effectively shorter funding cycle.

The COV considered the process and methods used by BSSD staff to assess progress to be appropriate and robust, particularly the use of triennial reverse site visits where accomplishments from SFAs and long-term projects are presented to the BER Program. The COV appreciated BSSD's transparency in managing SFAs and Lab Projects, especially the regular interactions between program managers and the SFA or Lab Project PIs. Importantly, the availability of funding through the Lab Project program and other short-term mechanisms mitigated impacts of sunseting SFAs and longer-term projects.

Quality of the portfolio

Based on annual progress reports, reviewer comments, and annual PI meeting outcomes, it was clear that the national lab funding portfolio generates potential and actual scientific impact. SFAs and Lab Projects balanced risks and rewards while enabling hypothesis-driven scientific advances relevant to DOE/BSSD mission priorities. For example, the Lab Projects program announcement (PA) issued in FY 2018-2019 for Bioimaging emphasized developing tools and technologies for “understanding plant metabolic processes impacting cell wall composition, synthesis and deconstruction for dedicated bioenergy biomass crop development, and engineering microbial pathways for production of fuels and chemicals from renewable biomass,” thus aligning with grand challenges outlined in the BSSD Strategic Plan. The PA issued in FY 2020 additionally emphasized the multidisciplinary development of quantum imaging strategies “to overcome the current challenges of suboptimal stability and photo-bleaching issues to enable prolonged imaging studies.” Still, the COV notes that a comprehensive assessment of national lab research impacts was challenging due to a lack of standardized metrics of success, especially for the longer-term SFAs.

The short duration of Lab Projects may limit the broad application of valuable new tools, instruments, and technologies. There is not a clear path to sustain, expand, or disseminate these outcomes to the broader scientific community, which could limit the breadth and impact of the portfolio.

Recommendations

1. The COV recommends that BSSD include information about the merit review process and criteria as a specific section within each SFA funding call. The COV also recommends that BSSD consider revising and streamlining the description of review criteria, some of which appeared verbose or too narrow.
2. To improve transparency for external parties, the COV recommends including a justification of eligibility criteria in SFA funding calls. For example, eligibility should be limited to national laboratories to support high risk, often time-sensitive projects that

leverage the collaborative structure of the national labs and generate outcomes with direct relevance to the BSSD and national lab mission priorities.

3. The COV recommends that BSSD clarify in national lab funding calls the process and review criteria by which pre-proposals are assessed.
4. The COV recommends elevating the annual Principal Investigator Meetings as a way to monitor the progress of Lab Projects. At the meetings, investigators present a project's accomplishments for a given year through abstracts, talks, and poster presentations, allowing BSSD program staff to assess potential use and impact of the tools and technologies developed.
5. To broaden impact and ensure that the scientific community can access newly-developed technologies, the COV recommends that BSSD require a sustainability plan for technology-based SFAs and Lab Projects. The plan should describe how the project outcomes will be integrated into user facilities or otherwise made broadly accessible after the project ends. BSSD should also consider making additional resources available to support technology transfer from individual projects to the community.
6. The COV recommends that there be more clarity and transparency on how decisions are made to support pilot SFAs and what metrics are used to determine whether a pilot should be sunset or renewed with longer term funding.

VIII. Enabling capabilities

National Microbiome Data Collaborative (NMDC)

DOE has supported many multi-disciplinary microbiome studies in the past two decades. These datasets reside in diverse locations, with non-standard formats and metadata. There is a recognized need for an architecture and repository with standardized data formats and organization to provide accessibility to the entire DOE community (and beyond). Based on a Congressional request in 2017/2018, DOE rapidly initiated a call to address this need. Due to their known expertise, a team led by LBNL and JGI was invited to lead this new initiative--the National Microbiome Data Collaborative (NMDC). Work started as a pilot project, and funding was later extended to support a multi-year effort.

The COV found that the NMDC fills an important need within the DOE BER research community and lauds the efforts to reach out to other institutions (e.g. Cy-Verse, NEON). However, the project selection and initiation process was not fully transparent, and concerns were raised about the perception of favoritism, which can undermine cooperation, collaboration, and collegiality between research teams. In addition, some reviews of NMDC mentioned the lack of an overarching vision and long-term sustainability plan. After the pilot period, BER pushed the NMDC to add additional expertise and capabilities at ORNL. BER has also directed the NMDC to form stronger links with the Earth sciences data repository ESS-DIVE.

Recommendations

1. The COV recommends that BER develop a more standardized and transparent process for starting large new programs, even when they arise urgently or from Congressional directives. To define their mandate and scope, BER should solicit input on these new initiatives from university, national lab, and private sector communities, even if there are

pre-existing centers of excellence in specific locations. Also, BER should implement a mechanism for peer review before the initiation of pilot projects, or soon thereafter.

2. The COV further recommends that BER establish clear, quantifiable metrics of success for large, complex programs. Currently, it is difficult to evaluate the impact of large community-focused programs like NMDC and KBase. Metrics such as publication counts and community engagement levels could help BSSD understand the return on investment and the optimal life cycle of funding.

Cryo-EM facilities

The initial investments into these facilities were deemed well-balanced and well-chosen. It is expected that important scientific findings will be forthcoming from these centers. Partial DOE funding for the national laboratories with NIH supported CryoEM Centers at PNNL, SLAC, and BNL is clearly strategic. Continuing support of these CryoEM infrastructures is vital for the growth of the BSSD user base.

Recommendations

1. As of now, the DOE-supported CryoEM facilities are located on either coast. In the future, the DOE is encouraged to broaden the geographic location of its supported CryoEM facilities to places such as the Midwest.

Joint Genome Institute

There is a clear recognition from review panels and publication history that the JGI fills a critical research need in both the BSSD and international scientific communities. JGI recognition and user engagement is very strong, well organized, and translates into well-cited work from many thousands of users. It is clear that BSSD staff have done a rigorous job in proactively overseeing the mission and impact of this facility. The regular reports were deemed informative and indicate that there is active dialogue between JGI and BSSD.

Although the operation of JGI has been fine-tuned and was perceived as very strong, there were some issues of concern to the COV. As high-throughput sequencing has become more widely available, JGI has expanded its technical portfolio. As these capabilities develop, it is not clear how much BSSD leadership has shaped the new directions and initiatives. Transitioning into DNA synthesis and synthetic biology is a logical extension of JGI strengths, but the rationale for moving into other areas--such as metabolomics--is less clear. There was some concern from prior reviewers about perceived overlap with EMSL. There is a risk of spreading resources too thin across many areas, thereby diluting JGI's value to the community. Concerns continue to be raised by reviewers about balancing JGI's mission between fundamental research and enabling capabilities for its user community. For example, many of the JGI's high profile publications are led by JGI staff. Finally, there have been issues and controversy surrounding JGI's data release policy that require ongoing attention.

Recommendations

1. BSSD is encouraged to play an even more active oversight role in defining the priorities and scope of JGI activities.
2. BER should encourage JGI to compile quantitative data to link user projects with deliverables, such as the number of publications per project (measured over 3-5 years).

DOE Knowledge Base (KBase)

KBase was developed to increase the ease, repeatability, quality, and consistency of biological analyses across the BSSD mission space. KBase aggregates data from JGI and other sources, and serves increasingly as an “app store” for internally developed and user-developed analysis pipelines. The scientific aspiration behind KBase is admirable, and both publications (225 in 2020) and users (15,000 in 2020) have grown significantly in the review period. Still, concerns were raised that adoption by the scientific community, including by BSSD researchers, has been slow relative to the overall investment in KBase.

Challenges in the review process for KBase proposals may be limiting the development of new capabilities and widgets. Specifically, for the National Lab call for KBase-SFA partnerships, review panels lacked sufficient balance in computational versus scientific expertise, meaning that there might be only one or two domain experts on a panel. For instance, review panels for some of the microbiome metagenome proposals included only one expert in metagenomics.

Recommendations

1. For KBase proposal review, create two sub-panels, with one scoring computational feasibility/scalability and the other scoring scientific merit. Such a structure would help ensure that reviewers are rating proposals based on their expertise and allow a more balanced assessment of computational and scientific merit. Moreover, the COV recommends appointing individuals with appropriate expertise in genomics, genome annotation, and metagenomics to KBase review panels.
2. To assess KBase adoption, the COV recommends tracking usage of individual widgets (e.g., the new PDB interface) to construct metrics that can be used for merit reviews and course corrections. Data on usage and associated publications would be useful for assessing KBase impact and the track records of investigator teams.

BSSD-sponsored user resources

DOE BER BSSD funds four synchrotron X-ray user resources at BNL, ANL, LBNL, and SLAC, and one neutron user resource at ORNL. These resources provide enabling capabilities and expert support in macromolecular crystallography, SAXS, SANS, X-ray spectroscopy, and FTIR and X-ray imaging activities. Following the 2017 COV recommendation, BSSD has made commendable efforts to continue supporting these resources and to encourage the resources to coordinate their outreach activities.

BSSD has been partnering with NIH NIGMS on supporting structural biology through X-ray, neutron, and more recently CryoEM infrastructure. The contribution of BSSD is particularly notable in technology development activities since most of the NIGMS P41 programs have been replaced with P30 programs (mature synchrotron technologies) which do not allow investments in developing new enabling capabilities.

Continuing the partial support for the Protein Data Bank is important. Recent funding for the KBase-PDB interface is a positive move, although it needs careful monitoring to ensure the added value for the BSSD community. Maintaining data quality and providing easy navigation tools for non-expert users are crucial. For example, PDB continues to have serious issues with the quality of many of its depositions. The COV was aware of multiple examples of deposited

protein structures containing known errors that have not been corrected. Some of these errors may arise when structures are computer-generated without being checked by an expert human prior to submission.

Program managers are doing an excellent job of communicating with all the facilities to ensure successful operations and new developments.

Recommendations

1. In the future, there should be a thorough discussion on how the BSSD decides which facilities and capabilities will be invited for future proposals.
2. It is strongly recommended that the BSSD work with other stakeholders on a nation-wide plan to ensure seamless user support during and after the “dark periods” of the two storage ring upgrades: APS-U for 12 months from April 17, 2023, and ALS-U for 1 year from April/May of 2025.

Appendix A: COV charge letter



Department of Energy
Office of Science
Washington, DC 20585

Office of the Director

Dr. Bruce Hungate
Regents' Professor, Biological Sciences
Northern Arizona University
SLF Building 17, Room 300A
600 South Knoles Drive
Flagstaff, AZ 86011

Dear Dr. Hungate:

By this letter, I am charging the Biological and Environmental Research Advisory Committee (BERAC) to assemble a Committee of Visitors (COV) to assess the processes used by the Biological Systems Science Division (BSSD) within the Office of Biological and Environmental Research to manage BSSD research programs and its user facility, the Joint Genome Institute (JGI).

The COV should provide an assessment of the processes used to solicit, review, recommend, and monitor proposals for research submitted to BSSD programs for FY2017 – FY2019. This includes funding at national laboratories and universities and other activities handled by the program during this time period. It should also assess the quality of the resulting scientific portfolio, including its breadth and depth and its national and international standing. Additionally, the COV should assess the division's management and oversight of the JGI user facility for the same time period. Specifically, I would like the panel to consider and provide an evaluation of the following:

1. For both the Department of Energy (DOE) national laboratory projects and university grants, assess the efficacy and quality of the processes used by BSSD programs during FY2017 – FY2019 to:
 - a) solicit, review, recommend, and document application and proposal actions, and
 - b) monitor active awards, projects, and programs.
2. Within the boundaries defined by DOE mission and available funding, comment on how the award process has affected:
 - a) the breadth and depth of the portfolio elements, and
 - b) the national and international standing of the portfolio elements.
3. For the JGI user facility, assess the division's management and oversight of this facility, including facility operations tracking and review, user proposal solicitation, review, and recommendation procedures.

For BSSD research programs, topics to be investigated can include, but are not limited to: the selection of an adequate number of qualified reviewers who are free from bias and/or conflicts of interest; use of the Office of Science merit review criteria; adequacy of documentation;



Printed with soy ink on recycled paper

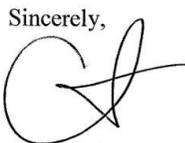
research; quality of the overall technical management of the program; relationships between award decisions, alignment with program goals, and the DOE mission; significant impacts and advances that have developed since the previous COV review and are demonstrably linked to DOE investments; the response of the program to recommendations of the previous COV review.

COV members will be given access to all program documentation completed during the period under review, including applications, proposals, review documents, and other requests. COV members may also request, at their discretion, a representative sample of the program portfolio. In response, BSSD may suggest a sample of program actions, including new, renewal, and supplemental applications and proposals, awards and declinations. In addition, COV members may choose to review files through a random selection process.

A primary requirement is that the COV have significant expertise across all covered areas within BSSD programs and that this expertise not rely upon one person alone. A second requirement is that a significant fraction of the committee receives no direct research support from DOE. A guideline is that approximately 25 percent of the members receive no direct support from DOE. Any person with an action pending (e.g., application or proposals under review, progress report pending approval) in a BSSD program under review will not participate as a COV member for that program. Some, but not all, members of a COV may be selected from a previous COV. At least one COV member must be a member of BERAC. The committee should be balanced and drawn from a broad field of qualified reviewers from academia, DOE National Laboratories, other Federal agencies, private sector entities, and other appropriate institutions. The BERAC chair should also consider a number of other balance factors including institution, geographic region, diversity, etc. The COV should effectively constitute an exceptional group of internationally recognized researchers with broad research expertise in the program areas within BSSD, as well as deep familiarity with DOE programs. Additional guidance on COV reviews within the Office of Science can be found at <https://science.osti.gov/sc-2/committees-of-visitors/> and attachments therein.

The COV should take place in summer 2020 in a location in or near Germantown, Maryland. A discussion of the COV report by BERAC should be held no later than the fall 2020 BERAC meeting. Following acceptance of the full BERAC membership, the COV report, with findings and recommendations, is to be presented to me as the Director, Office of Science.

If you have any questions regarding this charge, please contact Todd Anderson, (301) 903-5469 or by email, Todd.Anderson@science.doe.gov.

Sincerely,


Chris Fall
Director
Office of Science

cc. Sharlene Weatherwax

Appendix B: COV members and responsibilities

Name	Institution	Email address	Subcommittee
Steven Allison	University of California Irvine	allisons@uci.edu	COV Chair
Hazel Holden ¹	University of Wisconsin	hazel_holden@biochem.wisc.edu	Enabling Capabilities
Bob Hettich	Oak Ridge National Lab	hettichrl@ornl.gov	Enabling Capabilities
Jennifer Pett-Ridge	Lawrence Livermore National Lab	pettridge2@llnl.gov	Enabling Capabilities
Soichi Wakatsuki	SLAC/Stanford	soichi@slac.stanford.edu	Enabling Capabilities
Ben Brown	Lawrence Berkeley National Lab	JBBrown@lbl.gov	Enabling Capabilities
Daniel Schachtman ¹	University of Nebraska	daniel.schachtman@unl.edu	FOA
Cara Santelli ²	University of Minnesota	santelli@umn.edu	FOA
Sue Rhee	Carnegie Institution for Science	srhee@carnegiescience.edu	FOA
Linda Duffy	National Institutes of Health-NCCIH	duffy1@mail.nih.gov	FOA
Doug Allen	Danforth Center/USDA	doug.allen@ars.usda.gov	FOA
Diane Jofuku Okamuro ¹	National Science Foundation	dokamuro@nsf.gov	National Lab
Julie Biteen	University of Michigan	jsbiteen@umich.edu	National Lab
Chris Dupont	J. Craig Venter Institute	cdupont@jvci.org	National Lab
Carrie Eckert	NREL/Oak Ridge National Lab	eckertca@ornl.gov	National Lab
Richard Ferrieri	University of Missouri	ferrierir@missouri.edu	National Lab

¹Subcommittee Leader

²Bioenergy Research Center Co-Leader

Appendix C: COV agenda

**Department of Energy
Biological and Environmental Research
Biological Systems Science Division
2021 Committee of Visitors Meeting
July 27-29, 2021**

All times ET

Zoom Meeting ID: 160 381 1270

Passcode: 377598

<https://www.zoomgov.com/j/1603811270?pwd=ODh1OFduOXJvVUFBMmB2IHki9vUT09>

Preliminary Activities (Dates/times TBD)

July 12, 3:00 pm Zoom and PAMS training by ORISE and BER – Dawn Adin

- Review of Meeting Logistics, Conflicts of Interests

Week of July 12 Background/Reference material available to COV in PAMS

- Uploaded into PAMS COV module under 'Reference Materials'
- Includes background information on BER and BSSD overviews, BSSD team biosketches, listings of FOAs and National Laboratory SFAs/projects, etc.

Tuesday, July 27

11:45 am Zoom connections available [15 min prior to start]

12:00 pm Welcome, Overview of the Office, and Charge to the Committee

- Welcome and Overview of BER [10']
 - Sharlene Weatherwax, BER Associate Director
- Agenda and Review of Charge Letter [20']
 - Steve Allison, COV Chair
- COV Member Introductions [15']
- Overview of BSSD [45']
 - Todd Anderson, BSSD Division Director

1:30 pm BSSD Staff Short Presentations and Q&A [60']

- Genomic Science Program – Cathy Ronning
- Bioimaging Science Program – Prem Srivastava
- Enabling Capabilities and User Facilities
 - Facility-Based Structural Biology and Imaging Resources – Amy Swain
 - Computational Biology – Ramana Madupu
 - User Facility Joint Genome Institute (JGI) – Ramana Madupu

2:30 pm Break and move to subcommittees [30']

3:00 pm Subcommittee sessions: Enabling Capabilities and User Facilities, National Laboratory, Funding Opportunity Announcement [30']

- Session begins with brief overview presentation of group and its programs by PMs
 - Funding Opportunity Announcement (FOA) Subcommittee
 - General FOA Processes – Pablo Rabinowicz
 - Bioenergy Research Centers Management – Kent Peters
 - National Laboratory Subcommittee – Boris Wawrik
 - Enabling Capabilities and User Facilities – Ramana Madupu and Amy Swain
- COV members begin working on reviewing material
- BSSD staff available in the zoom sessions to address questions and assist with PAMS

- 3:30 pm Subcommittee Sessions (continued): [60']
- Zoom continues for discussions among COV members
 - BSSD staff out of zoom breakout sessions, but available by zoom (holding session), email or phone to address questions
- 4:30 pm Subcommittees brief BSSD staff, ask questions, request further information if needed [30']
- Discuss relative progress in subcommittees and observations from discussions
 - Subcommittee check lists/reports
 - Consider any course corrections
 - Additional requests of BER needed for next day (as needed)
- 5:00 pm Adjourn for the day
- Zoom ends for the day
 - Subcommittees can continue working offline

Wednesday, July 28

- 11:30 am Zoom connections available [15 min prior to start]
- 11:45 am COV Executive Session [15']
- 12:00 pm Subcommittee Sessions reconvene [4 hr]
- COV members continue reading, discussing, and completing subcommittee check lists and reports
 - BER staff available by zoom, email, or phone to address questions
- 4:00 pm Executive Session with BSSD management with report-outs from subcommittee leads on subcommittee reports [60']
- COV discusses initial subcommittee reports, decides if more information or other work is needed
 - Opportunity to ask questions and clarify any issues
- 5:00 pm Adjourn for the day
- Zoom ends for the day
 - Subcommittees can continue to work offline

Thursday, July 29

- 11:45 am Zoom connections available [15 min prior to start]
- 12:00 pm Subcommittee Sessions and Writing (BSSD staff on stand-by) [3 hr 30']
- Complete report write-up
- 3:30 pm Executive Session with COV, BER management, and BSSD staff [60']
- Presentation of key findings and recommendations
- 4:30 pm Download clean-up demo (Apple and PC) [30']
- BER to walk COV members through steps to remove files from personal computers
- 5:00 Adjourn

Appendix D: BSSD staff members

Name	Role or expertise
Todd Anderson	Division Director
Cathy Ronning	Plant Genomics, Sustainability, Genomic Science Program Team Lead
Kent Peters	Bioenergy Research Centers
Dawn Adin	Microbial Conversion
Pablo Rabinowicz	Biosystems Design
Ramana Madupu	Computational Biosciences, JGI, NMDC, KBase
Boris Wawrik	Environmental Microbiology
Shing Kwok	Bioenergy Research Centers, Sustainability
Prem Srivastava	Bioimaging Science
Amy Swain	Structural Biology and Imaging Resources
Paul Sammak	Bioimaging Science/Quantitative Information Sciences
Resham Kulkarni	Computation Platforms
Elizabeth White	DOE Human Subjects Research
Meredith Rutledge	BSSD Scientific Program Specialist and Budgeting
Wayne Kontur	AAAS Science and Technology Policy Fellow