2019 REPORT

TEXAS ADVANCED COMPUTING CENTER | UT AUSTIN

LFW

2019 LARGE FACILITIES WORKSHOP

APRIL
2-4

NSF

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TEXAS ADVANCED COMPUTING CENTER A NATURAL HAZARDS ENGINEERING COMMUNITY

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NSF 2019 Large Facilities Workshop

1. INTRODUCTION

1.1. Purpose & Intended Audience

The Large Facilities Workshop (LFW) is an annual event hosted by the National Science Foundation's (NSF) Large Facilities Office (LFO). The workshop is a collaborative forum for NSF's Large Facilities community, intended to provide participants with continuous learning and information sharing opportunities. Desired outcomes to advance the NSF mission of scientific research at Large Facilities include:

- Sharing knowledge and experience with best practices and common challenges that arise for both NSF and its Large Facilities
- Discussing new initiatives and engaging the Large Facilities community for input
- Demonstrating project management, operations, and business-related tools and techniques
- Expanding our community of practice and connecting colleagues from large complex scientific facilities to share information, experience, and expertise

The workshop targets the following professionals who have a role in the development, planning, construction, or operation of large complex scientific facilities:

- Facility and operations managers
- Property and maintenance managers
- Cooperative agreement and contracting officers
- Business professionals
- Project managers, estimators, schedulers, and controllers
- Principal investigators and scientists
- Engineers and construction managers
- Policy and oversight stewards

Workshop attendees and speakers may earn credits in the form of continuous learning points towards various certifications, such as AACE International's Cost Estimating Professional or Earned Value Professional, state Professional Engineering License, Project Management Institute's Project Management Professional, and Federal Acquisition Certifications for Program and Project Managers and Contracting Officer's Technical Representative.

1.2. Format

The agenda and presentations from the workshop are included in Appendices A and C and available on the 2019 NSF LFW website. The list of participants and an overview of the range of participants are included in Appendix B and Section 3.

The agenda was structured to provide a diverse selection of relevant topics for the Large Facilities community. Various approaches for information sharing were used, such as plenary presentations and break-out sessions featuring presentations and panel discussions. The workshop was also structured to present NSF's evolving oversight approach at a high level, followed by more detailed discussions of key elements.

The workshop strived to include topics applicable to all facility life cycle stages, with a majority of sessions focused on operating facilities. Speakers were encouraged to present and elicit "Best Practices" and "Actionable Recommendations," which were captured by dedicated note takers and compiled in this report.

1.3. Location

The 2019 Large Facilities workshop took place in Austin, TX at the Texas Advanced Computing Center (TACC) at the University of Texas at Austin. The workshop is held every year, with even year workshops in the Washington, DC area and odd year workshops in the field at a Large Facility.

2. PRESENTATION HIGHLIGHTS

This section provides brief summaries of the presentations, including their purpose and main points. Key takeaways from interactive discussions that can be characterized as "Best Practices" or "Actionable Recommendations" are also noted. Where possible, organizations responsible for following up on any actions are identified. This section is intended to summarize and supplement the detailed expert slide presentations, not to transcribe all comments and discussions. More detailed but rough notes on the various viewpoints expressed during the discussions are available and may be requested from LFO. These notes will be used by LFO to help inform the Action Recommendations.

The NSF Major Facilities Knowledge Sharing Gateway provides links to all workshop presentations. Direct links to each presentation are provided below.

2.1   Tuesday, April 2, 2019

NSF Opening Remarks

Speaker: Teresa Grancorvitz, NSF Chief Financial Officer and Head, Office of Budget, Finance and Award Management and Matt Hawkins, Head of the NSF Large Facilities Office

Description: NSF welcomed participants and highlighted key NSF activities associated with research infrastructure.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/Opening-Remarks_Grancorvitz-Hawkins.pdf

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Large Facility Spotlight

Speaker: Adam Bolton, Acting Deputy Director, National Optical Astronomy Observatory; Scott McIntosh, Interim Deputy Director, National Center for Atmospheric Research; Mark McKinnon, Assistant Director, New Mexico Operations, National Radio Astronomy Observatory & Thomas Rimmele, Project Director, 4m Daniel K. Inouye Solar Telescope

Description: Brief presentations were made by representatives from NSF-supported Federal Funded Research Development Centers (FFRDCs). Each Center shared an accomplishment, event, and/or challenge that took place in the past year. Following the presentations, workshop participants had an opportunity to ask questions of the panel of presenters.

Link to Slides:
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LargeFacilitySpotlight_Bolton.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LargeFacilitySpotlight_McIntosh.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LargeFacilitySpotlight_McKinnon.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LargeFacilitySpotlight_Rimmele.pdf

Best Practices:
- Build collaboration across the traditional discipline organizations and communities to solve complex problems
- Workforce development is needed to address common challenges such as an aging workforce, but also for the unique technical skills required

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Introduction to TACC and NHERI

Speaker: Dan Stanzione, Associate VP for Research, University of Texas at Austin

Description: This session provided a capabilities overview of TACC and NHERI.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/IntroTACC-NHERI_Stanzione.pdf

The Role of Education and Public Outreach (EPO) During Construction and Operations

Speaker: Amanda Bauer, Head, Education & Public Outreach, LSST; William Buckingham, Manager, Kitt Peak National Observatory & Sharon Cooper, Manager, Education & Outreach, U.S. Science Support Office, International Ocean Discovery Program

Description: This session explored models for the construction and operations of EPO at large facilities, including integrating EPO in construction and facility construction (e.g., LSST), and other ways to build and support quality EPO programming.

Link to Slides:
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/EPO-DuringConstructionOperations_Bauer2.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/EPO-DuringConstructionOperations_Buckingham.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/EPO-DuringConstructionOperations_Cooper.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/EPO-Handout.pdf

Best Practices:
- Assessment should be continuous: analytics monitored and surveys done often; and focus groups held less frequently
- In construction, look at what others are doing well and borrow ideas
- Network with groups like IAU Education group; reach out to people who have led projects
- Important to develop new channels to distribute information as science journalism wanes
- Large facilities should collaborate with each other
- Develop ways to help people, who might not have the related background or skill set, interact with data

Bridging the Communications Gap for Key Stakeholders – Part I

Speaker: Amanda Greenwell, Head, NSF Office of Legislative and Public Affairs (OLPA); Adrian Apodaca, Senior Graphic Designer, NSF OLPA; Ranpal Gill, Communications Manager, LSST; Shari Lifson, Communications Coordinator, AURA; & John Taber, Director, Education & Public Outreach, IRIS

Description: Communicators from across NSF and the Large Facilities discussed topics including the impact of the 2018 NSF branding guidelines and its implementation by recipients. Insights into social media from NSF as well as success stories from facilities were also shared. Q&A allowed discussion on how all can work together towards more communications successes.

Part I: Branding and Renaming:
- NSF Branding and Name Recognition
- (Re)Branding, Addressing Challenges and Lessons Learned
- Challenges and Opportunities in (Re)Naming a Facility

Link to Slides:
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom1_Apodaca.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom1_Lifson.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom1_Taber.pdf

Best Practices: Branding:

- Use recently released NSF logos found at nsf.gov/logo
- Follow NSF branding guidelines
- Reinforce message that the government, and therefore the public, plays a critical role in cutting-edge science
- Update highest traffic websites with new NSF logo
- For existing resources that are hard to change (e.g., slides and educational materials), concentrate on updating NSF branding when revising these
- If renaming, consider co-branding (continuing to use old name with new one, especially if new name might be temporary)
- For naming, test on-target audiences to make sure it's unique, sounds ok in other languages, is meaningful, not too long, and appropriately descriptive
- Consider putting logos at the top of banners and conference materials so they don't get covered by furniture
- Consider a naming contest when renaming, but make sure to implement guidelines so you have control over the outcome
- NSF is close to having their naming protocol finalized
- "NSF Street" or "NSF Pavilion" model could be used to group NSF facilities at conferences or other events
- Put up "FREE!" signs if there is confusion about whether NSF booths are providing a service or selling something

Social Media:

- An aggressive social media campaign can leverage low-level social media resources
- Posts involving a person are very popular
- Encourage PIs to use social media
- A codified social media strategy can help get PIs at different facilities to feel comfortable posting on behalf of a centralized organization
- Use #NSFFunded or #NSFStories
- Two-way engagement is most effective
- Reach out to NSF OLPA to coordinate press releases, request a quote, amplify a major discovery, share an idea for a story
- OLPA can help initiate and coordinate media visits to your facilities
- Strategy and research and thoughtfulness determine success in social media
- Look at Pew research on social media to determine best strategy
- Social media is a good way to feature people who don't normally get attention
- Each post should have purpose: e.g., building awareness, education, advertising, call to action

Actionable Recommendations:

- NSF requests that facilities make sure PIs know they should only tag NSF in science-related posts (not personal posts)
- Facilities would like advance notice of NSF campaigns, so they have time to plan participation
- Suggestion to set up a Slack channel to talk about coordinated social media campaigns
- If these topics are discussed next year, in-person participation from OLPA representatives is requested

An Update on the LFM (retitled Major Facilities Guide)

Speaker: Matthew Hawkins, Head, NSF LFO, BFA; Bill Miller, Science Advisor, NSF Office of Advanced Cyberinfrastructure; Joy Pauschke, Program Director, NSF Division of Civil, Mechanical & Manufacturing Innovation; Kevin Porter, NSF Large Facilities Advisor, LFO; Eddie Whitehurst, Deputy Branch Chief, NSF Cooperative Support Branch; Rebecca Yasky, NSF Large Facilities Advisor; & Jeff Zivick, NSF Large Facilities Advisor

Description: The updated Large Facilities Manual (LFM), now under the new title, Major Facilities Guide (MFG), is scheduled to be in effect in Fall 2019. This revision adds a section for guidance on mid-scale research infrastructure projects; updates sections related to NSF policy on research infrastructure; roles and responsibilities for NSF staff; divestment stage; earned value management; cybersecurity; and property management; and clarifies cost estimating requirements including the construction stage total project costs and NSF policy on contingency and reporting requirements. This session provided a brief presentation of the changes and gave participants the opportunity to ask questions regarding these changes.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LFMupdate_Yasky.pdf

Bridging the Communications Gap for Key Stakeholders – Part II

Speaker: Cheryl Ann Blain, Communications Lead, NHERI; Jennifer Plozai, Head External Affairs, NSF OLPA; Claire Raftery, Head, Communications, EPO, National Solar Observatory; Sarah Sulick, Public Affairs Specialist, NSF OLPA

Description: Part II: Social Media:
- Insights on social media
- Herding Cats: Ramping up a social media presence with a ten-facility network
- Social Media Insights from a Solar Observatory

Link to Slides:
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom2_Blain.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom2_Raftery.pdf

Auditors and Best Practices

Speaker: Elizabeth Goebels, Director, Performance Audits, NSF Office of Inspector General, Office of Audit

Description: The OIG led discussions on past audit results, identification of risk trends and emerging issues, audit coordination, and the resolution of past issues. The session included an interactive question and answer session.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/AuditorsBestPractices.pdf

Best Practices:
- Pass-Through Entities (PTEs) document risk assessments for subrecipients, and determine the appropriate level of monitoring
- Follow the instructions in the Budget section of the Major Facilities Guide to distinguish subaward recipients from contractors
- PTEs can search past A-123 audit reports on subrecipients to aid decisions on the level of monitoring and oversight
- Document the allocation decision making process: who and why. Provide a clear basis for the decisions. Document the rationale for each decision.
- Have an allocation plan. May back up with NSF approval.

Education and Public Outreach (EPO) Best Practices and the Diversification Challenge

Speaker: Donna Charlevoix, Director, Education and Community Engagement, UNAVCO; Sue Ann Heatherly, Senior Education Officer, Green Bank Observatory; Roxanne Hughes, Director, Center for Integrating Research & Learning, National High Magnetic Field Laboratory; Jim Madsen, Associate Director, IceCube Neutrino Observatory; Kristin Roberts, Public Affairs Director, National High Magnetic Field Laboratory & Tim Spuck, Director, Education & Public Engagement, Associated Universities, Inc.

Description: This session focused on best practices in STEM education and workforce development, diversity and inclusion, and building collaborations. EPO professionals from across the NSF Large Facilities portfolio shared exemplar programs and practices and discussed exploring future projects and collaborations. Topics covered:

- Inspiring the Next Generation
- STEM Workforce Development: The Umbrella for Education, Outreach and Communications at an NSF Facility
- Building a Multimessenger Diversity Community of Practice: The IceCube Multimessenger@INCLUDES Initiative
- Broadening Impact through Education and Outreach
- Amplifying EPO through Collaboration: A Story from the NSF Funded Observatories in Chile

An Open Mic Shar-a-thon enabled audience participation. Audience members had the opportunity to provide an elevator pitch on their programs/projects and best practices.

Link to Slides:
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/EPO_Hughes_Roberts.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/EPO_Madsen.pdf

Best Practices:
- Connect undergrad STEM students with younger ones (K-12)
- Immersive research experiences need to engage on a deep level
- Give students high-quality, informal interactions with professional scientists
- Allow students to experience what research really is
- Have a themed "open house" event to bring a different audience to your facility
- Print magazine allows multiple facilities to collaborate and publish long-form articles
- Provide materials (e.g., slides) for people in your partnership, to explain your partnership
- In partnerships/collaborations, people should have flexible guidelines, so they can do what works for their organization

Applying the Learning Culture Concept to NSF's Major Facilities Knowledge Management Program

Speaker: Jose Martens, Senior Financial Compliance Manager, AURA; Virginia Taberski, Contracts Director, UCAR, & Rebecca Yasky, NSF Large Facilities Advisor

Description: This session was conducted in two parts. The first part developed an understanding of how the NSF Major Facilities Knowledge Management Program functions and the interfaces between NSF and Facilities. As a follow-on to last year's Knowledge Management session, participants in small groups identified techniques for discovery of best practices and lessons learned within their organization to cultivate the NSF Major Facilities Knowledge Management Program. Each group shared key outcomes of their discussions.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/ApplyingLearningCulture.pdf

2.2 Wednesday, April 3, 2019

EPO, Branding and Communications – Drill Down Hot Topics Discussion – Part I

Speaker: Anne Kornahrens, Science & Technology Fellow, NSF Directorate for Mathematical and Physical Sciences

Description: Participants engaged in a focused discussion and brainstorming session on branding, (re)naming and social media. The session allowed for a deep drill into hot topics that came up on day 1. The session featured a short highlight of "Examining EPO Activities at MPS Facilities," by Anne Kornahrens, AAAS S&T Policy Fellow, serving at NSF in the MPS Office of the Assistant Director.

Link to Slides: No slides were used during this session.

Best Practices:
- Make sure the guidance gets to who it needs to: the people who actually do social media
- Look for ways to engage with communities of professionals in similar positions at different organizations
- Survey your program participants about social media
- Facilities need to define what "outreach" and "broader impacts" mean to them
- Establish the narrative you want to tell and then decide which platforms to use
- Leverage your scientific users
- Focus on a key event and have three people dedicated to posting on social media; have the event organizer amplify
- Have scientists live-tweet their day

Actionable Recommendations:
- NSF should provide facilities with key messages in addition to branding guidelines
- Facilities would like an online community; NSF could help by supplying a tool (e.g., Slack). At the least, NSF should be an active participant in that community

Business System Reviews – Updates and Practices

Speaker: Rob Hengst, NSF Large Facilities Advisor; Florence Rabanal, NSF LFO, & Eddie Whitehurst, Deputy Branch Chief, NSF Cooperative Support Branch

Description: This session provided an overview of the revised Business Systems Guide. Then participants engaged in small group activities to identify experiences and challenges with applying the BSR framework to support the organizational operations, management, and monitoring of Major Facility awards.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BusinessSystemsReview.pdf

EPO, Branding and Communications – Drill Down
Hot Topics Discussion – Part II

Speaker: Anne Kornahrens, Science & Technology Fellow, NSF Directorate for Mathematical and Physical Sciences

Description: Participants took part in a discussion and brainstorming session on STEM, EPO diversification and cross-center collaboration. This session allowed for a deep drill into the hot topics that came up on day 1.

Link to Slides: No slides were used during this session.

Best Practices:
- Include target audience in creation of programs
- Have interpreters (e.g., sign language) at programs
- Don't require transcripts in application processes
- Look at trends and long-term results rather than focusing on program numbers
- Read the NSF Guide to evaluate formal education
- If measuring who goes into a career, follow participants on LinkedIn
- Involve families in camps (for parental buy-in)
- Research Experiences for Undergraduates (REU) PI network has evaluation resources

Independent Cost Estimates for Scientific Facilities – Approaches and Benefits

Speaker: Denise Castro-Bran, Director, Systems & Operations Assurance Dept., Aerospace Corporation; Marc Hayhurst, Project Engineer, Strategic Assessments & Studies Directorate, Civil Systems Group, Aerospace Corporation; Matthew Marshall, Director, Acquisition & Facility Assessments, Aerospace Corporation's Civil Systems Group; & Vera Scheidlinger, Project Leader, Strategic Assessments & Studies Directorate, Civil Systems Group, Aerospace Corporation

Description: This presentation discussed the methodology, assumptions, and best practices for performing independent cost estimates (ICEs) for major research facilities either as part of a major upgrade to an existing facility or as part of a new major facility proposal.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/IndependentCostEstimates.pdf

Best Practices:
- Importance of interviews and reconciliation with project teams to review assumptions and ensure technical baseline is accurately captured
- The more detailed technical data that is provided, the better, to allow a wider range of estimating methodologies
- An integrated systems approach and clear definition and traceability of requirements, and careful consideration of quality assurance and acquisition approach will help minimize cost and schedule risk

Interacting with Congress

Speaker: Grace Cummings, Founder, Working with Congress

Description: The plenary session provided an overview of Congress, its organization and processes, to give attendees a framework to build and maintain support for their programs and an understanding of Congress on par with Congressional member and staff expectations.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/InteractingCongress.pdf

Interacting with Congress Breakout – Part I

Speaker: Grace Cummings, Founder, Working With Congress

Description: The first of two one-hour breakout sessions was structured as interactive exercises to help attendees prepare for various Congressional interactions, including communicating effectively, recognizing the 3 P's, and utilizing available tools to research different scenarios.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/InteractingCongressHandout.pdf

Lessons from Large Facilities Development and Operation in Remote Environments

Speaker: George Blaisdell, Consulting Engineer, Merrick & Co. & Christine Lurtz, Project Manager, Antarctica

Description: This session consisted of two parts. During part (1), Christine Lurtz presented on the digital assessment management tools, LiDAR and BIM, for design and operations efficiencies. The application of best practice digital tools was discussed as it pertains to modernizing management of legacy and new infrastructure in McMurdo, Antarctica. In part (2), George Blaisdell discussed remote infrastructure monitoring and management, including use of instrumentation and simple data analysis in creating situational awareness and decision support for infrastructure in McMurdo, Antarctica and Summit, Greenland.

Link to Slides:
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/LessonsLargeFacilities-Remote_Blaisdell.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/LessonsLargeFacilities-Remote1.pdf

Best Practices:
- Use infrastructure monitoring and management tools to monitor performance, establish metrics, track and predict operations and maintenance costs, plan repair/rebuild/replace timelines, assess sensitivities, and allow quick and remote access to information
- Use LiDAR and Building Information Modeling tools for asset management, including development of 3D modeling of as-built conditions, operations and maintenance manuals and databases

Interacting with Congress Breakout – Part II

Speaker: Grace Cummings, Founder, Working With Congress

Description: The second of two one-hour breakout sessions was structured as interactive exercises to help attendees prepare for various congressional interactions, including communicating effectively, recognizing the 3 P's, and utilizing available tools to research different scenarios.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/InteractingCongressHandout.pdf

The Rise of Privacy: A Risk-based Approach to Privacy Oversight, Compliance & Management for Research Facilities

Speaker: Mike Cullen, Senior Manager, Baker Tilly Virchow Krause, LLP & David Ross, Principal, Cybersecurity Growth Leader, Risk, Internal Audit & Cybersecurity Practice

Description: A great deal of confusion is swirling around about the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA). With GDPR enforcement in full force and CCPA coming soon, many research institutions, universities, and government contractors are struggling with compliance. This discussion focused on how to evaluate privacy risks and build sustainable privacy programs using real world examples. Specifically, participants: (1) Gained an understanding of the regulation and its impact on

research; (2) Learned to quantify the risk to an institution with multiple privacy and compliance requirements; (3) Learned about data subject rights and how they apply in a complex environment; and (4) Learned about the need and role of a Data Privacy Officer (DPO) programs using real world examples. Participants left with a basic level understanding of the GDPR.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/RiseofPrivacy_Cullen.pdf

2.3 Thursday, April 4, 2019

Branding, Communications and EPO – the Feedback Loop

Speaker: Ranpal Gill, Communications Manager, LSST; Anne Kornahrens, Science & Technology Fellow, NSF Directorate for Mathematical and Physical Sciences; & Tim Spuck, Director, Education & Public Engagement, Associated Universities, Inc.

Description:
- Needs that have been uncovered
- Actions that can be taken (What will be done between LFW 2019 and 2020?)
- How will we measure the effectiveness of actions and feed results into further improvement?
- Sharing those results at LFW 2020 – the continuous feedback loop

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BrandingCom_Gill2.pdf

Best Practices:
- Have a purpose and goals set before worrying about details

Actionable Recommendations:
- Develop and deploy a survey to determine interest in a working group/network, and people who would be interested in helping organize and manage it (Ranpal Gill with LSST plans to send this out)
- Create a Facebook page (Kristin Robb with National Magnetic Lab plans to do this) for EPO/Comms staff of NSF Large Facilities

Defining Science Requirements, Managing Scope, and Ensuring Delivery

Speaker: Tom Gulbransen, Project Manager, National Ecological Observatory Network

Description: To characterize and quantify how our nation's ecosystems are changing, National Ecological Observatory Network's (NEON) leadership established project management methods to communicate and govern Operations across its 81 sites, in 20 regions, performing instrumented and observational sampling, to publish 177 data products. This session highlighted project management practices found to be effective when juggling competing needs of customers, fieldwork, EPO, and cyberinfrastructure.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/DefiningScienceRequirements.pdf

Best Practices:
- Adopting an agile approach gives flexibility in management
- Establish good conversion from agile progress to EVM %-complete
- Use of integrated product team and layering of roles is very helpful
- Allow time for team adjustment

User Program Practices

Speaker: Joel Brock, Director, Cornell High Energy Synchrotron Source; Jose Martens, Sr. Financial Compliance Manager, AURA; Eric Palm, Deputy Lab Director, National High Magnetic Field Laboratory & Lory Wingate, Sr, Vice-President and COO, UCAR

Description: A panel representing NSF Major Facilities provided an overview of their user programs, including their community, services, and challenges. They discussed performance

measurements and how these are aligned with the facility mission and user satisfaction and outreach. Each facility made a presentation and then the panel answered questions from workshop participants.

Link to Slides:
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/UserProgramPractices.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/UserProgramPractices_Palm.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/UserProgramPractices_Wingate.pdf

Best Practices:
- Metrics should be displayed in graphics for easy communication and longitudinal to see trends
- Metrics need to be structured to drive operational decisions

Enterprise Risk Management of Large Facility Projects

Speaker: Stephen Unwin, Head, Risk Programs Development, Pacific Northwest National Laboratory

Description: Large facility projects are exposed to a shifting variety of risks throughout their lifecycles — performance, regulatory, budgetary, research, contracting and political, among others. Key prerequisites to the effective management of such risks are understanding them and characterizing them. This characterization can be qualitative, and it can be quantitative, but what it must always be in order to meet the needs of all stakeholders, including the project management team, is systematic, transparent and defensible. Once the risks are understood and actionable, handling actions can then be developed to reduce the probabilities or the impacts of scenarios driving these risks. This presentation highlighted critical elements of the process for implementing a comprehensive enterprise risk management program, and lessons learned over years of experience in large project risk management.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/EnterpriseRiskMgt.pdf

Best Practices:
- Quantitative approaches and communication are really important (convey to stakeholders in a meaningful way)

Project Management and Business Core Competencies for Recipient Personnel

Speaker: Jeff Zivick, Large Facilities Advisor, NSF LFO

Description: This session discussed future NSF expectations for recipient organizations to identify key personnel who have the qualifications to fulfill a set of core competencies considered necessary for successfully managing an NSF major facility award. Based on input received from the 2018 Large Facilities Workshop, the team approach will be used for meeting the suite of competencies and qualifications and may include a combination of experience, education, training, or certifications. Competencies will also depend on the life-cycle stage of the project (Design, Construction or Operations).

The draft set of core competencies has been developed based on industry best practices and those for agency staff as required by the Program Management Improvement and Accountability Act (PMIAA). As part of this session, attendees were encouraged to provide feedback to NSF on drafting of this new section in the Major Facilities Guide (MFG).

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/ProjectMgtCoreComp.pdf

Best Practices:
- Project Management Improvement and Accountability Act (PMIAA), while not a requirement, may be good to look at for core competencies.

- Core Competencies not only mean fitting the right educational and training requirements to the job, but also fitting the right job experiences that are appropriate for the position.

Actionable Recommendations:
- The speaker is looking for community input on this topic and has provided his contact information. Please send your comments.

Supporting US Participation in the International Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC) Expedition

Speaker: Frank Rack, Program Manager, NSF Arctic Research Support and Logistics

Description: Starting in September 2019, the international Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC) initiative, will begin year-long observations in the high Arctic supported by the German icebreaker Polarstern, which will serve as a central observatory embedded within an extensive, distributed network of deployed sensors and instruments that will drift together across the Arctic Ocean and, when combined with additional airborne and satellite observations and modeling, will be used to better understand the evolving Arctic climate system, and the role it plays in a changing global climate. This talk described the international framework and processes for planning the logistics of the project, developing scientific observing teams, organizing scientific contributions, coordinating the use of resources, and ensuring MOSAiC's legacy of data and products, with a focus on the participants and projects supported by the National Science Foundation and other US federal agencies.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/SupportingMOSAiC.pdf

Best Practices:
- Keep up with supply requirements such as power and laboratory supplies, within funding constraints
- Minimize equipment on the ice; anchor instruments on the ice; floatation; back-up power; adapt to changing conditions; no garbage left on ice
- Train continuously. Learn: polar bear behavior; environmental health safety; data training; firearms training; handling of night vision goggles; air operations
- Ship provides protective gear; personal protective equipment; medical training; tracking; communication; ice floe navigations systems across nationalities

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Gearing Up for Design and Construction – Discussion with TACC

Speaker: Tim Cockerill, Director of User Services, Texas Advance Computing Center & John West, Director of Strategic Initiatives, TACC

Description: A Leadership Class Computing Facility is expected to soon enter the Design Stage. The session included a brief introduction to the Texas Advanced Computing Center (TACC) project and an engaging community discussion on how to build a project team and identify project management resources. Others were encouraged to share best practices and challenges from their experiences.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/GearingUpforDesign_Cockerill.pdf

Best Practices:
- Select qualified project management people and proven software tools early to develop, test, and evolve together as project progresses
- Use templates and databases for easier and timely data management, change control, and documentation (e.g., resources, cost, schedule, WBS dictionary)
- Get high quality cost estimators, schedulers, and project controls subject matter experts – needed for high quality estimate and schedule for baseline and earned value management

Ocean Observatories Initiative, Transition to a New Prime Awardee

Speaker: Paul Matthias, Sr. Program Manager & Chief Engineer, Woods Hole Oceanographic Institution

Description: In late 2018, the Ocean Observatories Initiative Prime Awardee transitioned from the Consortium for Ocean Leadership to the Woods Hole Oceanographic Institution. Lessons learned from the collaborative transition were related to the selection and creation of a Program Management Organization (PMO), knowledge and responsibility transfer methodologies, and subaward management tools and techniques.

Link to Slides: https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/OceanObservatoriesInitiative.pdf

Facility Cyberinfrastructure

Speaker: Ewa Deelman, Research Professor & Director, USC Information Sciences Institute & IEEE Fellow; Bill Miller, Science Advisor, NSF Office of Advanced Cyberinfrastructure & Manish Parashar, Office Director, NSF Office of Advanced Cyberinfrastructure

Description: This session highlighted important recent initiatives in the area of cyberinfrastructure for facilities. Ewa Deelman from USC presented on an NSF-funded pilot project to plan a Center of Excellence in Cyberinfrastructure focused on assisting major facilities. Other updates were provided on new CI resources and community activities, including planning for a follow-on NSF Facility CI Workshop.

Link to Slides:
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/FacilityCyber_Deelman.pdf
- https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/FacilityCyber_Parashar.pdf

Best Practices:
- To improve CI for LFs, face-to-face discussions are invaluable; identify/understand needs; find areas where improvements can be made; create working groups to attack problems.
- In the case of NEON, this led to development of new remote sensor visualizations, and speed up of data portal development.
- Process of collaboration helps CI CoE Pilot improve/formalize engagement; helps organize future activities
- From OAC perspective, CI is critical for Large Facilities; can amplify impact or hinder development
- Looking to develop mechanisms to identify/re-use/disseminate best practices for CI: led to creation of CI CoE Pilot and other grants
- Also working to fund develop tools for Missing Middle – products that sit between LFs and user workflows - to make science more impactful

Actionable Recommendations:
- CI CoE should engage with NIST FFRDC in Cybersecurity (NITRD-funded)
- Look to NASA for ideas for developing re-usable CI tools, centers; they have good models
- Utilize CI CoE as sounding board for thinking through big CI problems that LFs face/will face in the future

3. PARTICIPANT SUMMARY DATA

Appendix B contains the list of 196 registered workshop participants (although not everyone participated each day). NSF's Large Facilities were well represented. A cross section of different professionals were represented. Overall attendance exceeded expectations.

Professions by Organization

	NSF	Facilities/Others	TOTAL
Business Professionals	6	55	61
Operations Managers	0	9	9
Project Managers	1	13	14
Executives	0	21	21
Scientists, Engineers	4	22	26
Other / No Response	16	39	55
TOTAL	30	166	196

NSF Large Facility & Other Organizations Participation

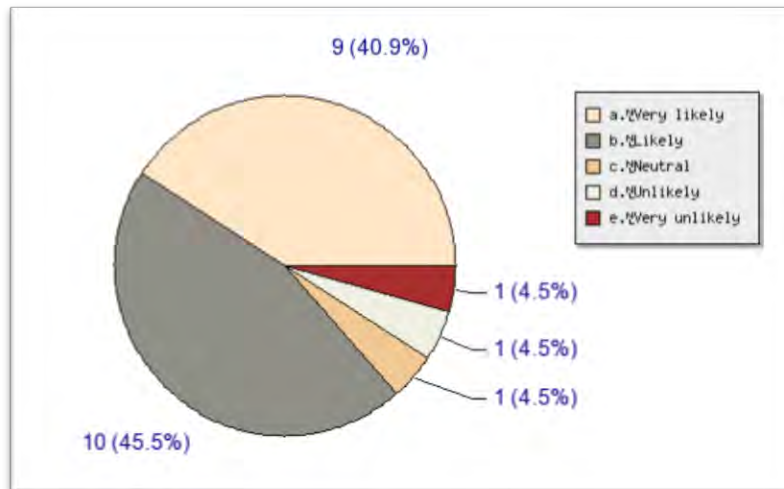| Organization	Acronym	# of Participants
Aerospace Corporation		4
Arecibo Observatory	AO	2
Associated Universities, Incorporated	AUI	6
Association of Universities for Research in Astronomy	AURA	7
Battelle		6
Colorado State University		1
Columbia University		6
Cornell High Energy Synchrotron Source	CHESS	1
Florida International University, Wall of Wind Experimental Facility		1
Florida State University, iDigBio	FSU	2
Florida State University, National High Magnetic Field Laboratory	NHMFL	2
Gemini Observatory	Gemini	3
IceCube Neutrino Observatory	ICNO	1
Indiana University, Center for Applied Cybersecurity Research	CACR	1
Incorporated Research Institutions for Seismology	IRIS	2
Large Synoptic Survey Telescope	LSST	5
Michigan State University, National Superconducting Cyclotron Laboratory	MSU/NSCL	2
National Center for Atmospheric Research	NCAR	9
Natural Hazards Engineering Research Infrastructure	NHERI	3
National Optical Astronomy Observatory	NOAO	3
National Radio Astronomy Observatory	NRAO	4
National Solar Observatory	NSO	7
National Superconducting Cyclotron Laboratory	NSCL	2

Organization	Acronym	# of Participants
Oregon State University, College of Earth, Ocean, and Atmospheric Sciences	CEOAS	6
Pacific Northwest National Laboratory		1
Penn State Institute for CyberScience		1
Rutgers University		1
Sandia National Labs		1
Scripps Institution of Oceanography, UCSD		1
Smithsonian National Physical Observatory		1
Southeastern Universities Research Association		1
Texas Advanced Computing Center	TACC	5
Texas A&M University		1
Texas Tech University		1
Thirty Meter Telescope International Observatory	TMT	3
UNAVCO	UNAVCO	6
University Corporation for Atmospheric Research	UCAR	6
University of California, Davis		1
University of California San Diego	UCSD	2
University of Florida		2
University of Illinois, National Center for Supercomputing	NCSA	5
University of Texas, Austin		3
Woods Hole Oceanographic Institution		7

4. SURVEY, IDEA EXCHANGE, AND WORKSHOP DEBRIEF – SUMMARY OF RESULTS & ACTIONABLE RECOMMENDATIONS
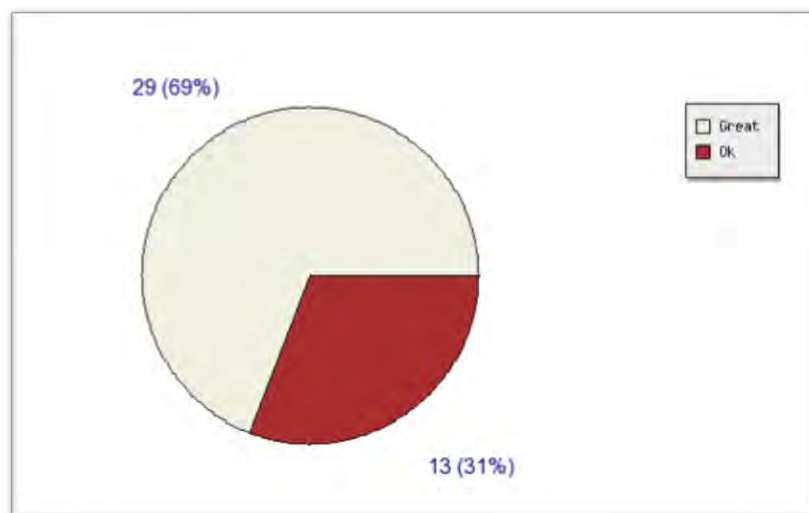
4.1 Key Survey Results

How likely are you to come to next year's Large Facilities Workshop?
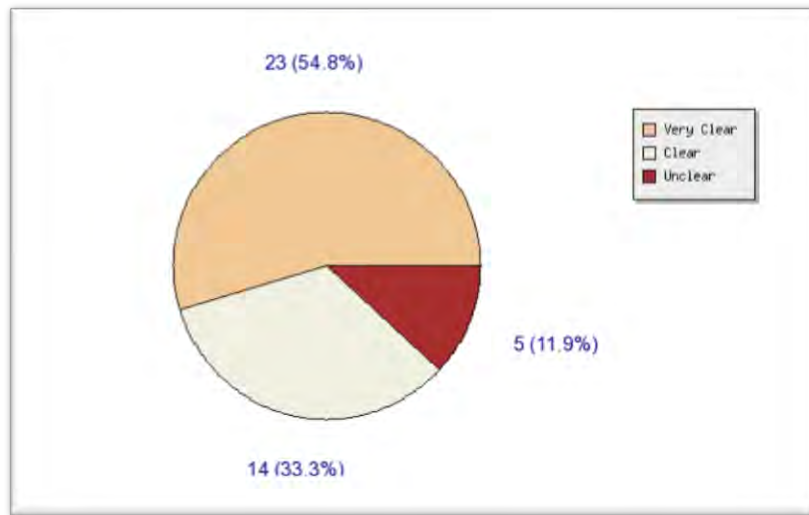
22 responses

How would you rate communication from meeting planners about workshop location, date, registration details and other information?

42 responses

How would you rate communication about the purpose and intended audience of the workshop?

42 responses

APPENDIX A: WORKSHOP PROGRAM SCHEDULE

SESSIONS

Tuesday, April 2, 2019

NSF Opening Remarks
8:00am
Teresa Grancorvitz, NSF Chief Financial Officer & Matt Hawkins, Head of the NSF Large Facilities Office
This session will highlight key NSF activities associated with research infrastructure.

Large Facility Spotlight
8:30am
Adam Bolton, Scott McIntosh, Mark McKinnon & Thomas Rimmele
See brief presentations from the NSF supported Federal Funded Research Development Centers (FFRDCs). Each Center will introduce who they are and share an accomplishment, event, and/or challenge that took place in the past year. Following the presentations, workshop participants will have an opportunity to ask questions of the panel of presenters.

Introduction to TACC and NHERI
9:45am
Ellen Rathje & Dan Stanzione
A capabilities overview of TACC and NHERI.

The Role of Education and Public Outreach (EPO) During Construction and Operations
10:50am
Amanda Bauer, William Buckingham & Sharon Cooper
This session will explore models for the construction and operations of EPO at large facilities, including integrating EPO construction and facility construction (e.g. LSST), and other ways to build and support quality EPO programming.

Bridging the Communications Gap for Key Stakeholders – Part I
1:05pm
Amanda Greenwell, Adrian Apodaca, Ranpal Gill, Shari Lifson & John Taber
Join communicators from across NSF and the Large Facilities to discuss topics including the impact of the 2018 NSF branding guidelines and its implementation by recipients. Insights into social media from NSF as well as success stories from facilities will also be shared. Q&A will allow discussion on how all can work together towards more communications successes.
Part I: Branding and Renaming
- NSF Branding and Name Recognition
- (Re)Branding, Addressing Challenges and Lessons Learned
- Challenges and Opportunities in (Re)Naming a Facility

An Update on the LFM *(retitled Major Facilities Guide)*
1:05pm
Matthew Hawkins, Bill Miller, Joy Pauschke, Kevin Porter, Eddie Whitehurst, Rebecca Yasky & Jeff Zivick
The updated "Large Facilities Manual (LFM)" under the new title "Major Facilities Guide (MFG)" is scheduled to be in effect in Fall 2019. This revision adds a section for guidance on mid-scale research infrastructure projects; updates sections related to NSF policy on research infrastructure, roles and responsibilities for NSF staff, divestment stage, earned value management, cybersecurity, and property management; and clarifies cost estimating requirements including the construction stage total project costs and NSF policy on contingency and reporting requirements. This session will be a brief presentation of the changes and give participants the opportunity to ask questions regarding these changes.

Bridging the Communications Gap for Key Stakeholders – Part II
2:05pm
Cheryl Ann Blain, Jennifer Plozai, Claire Raftery & Sarah Sulick
Part II: Social Media
- Insights on Social Media
- Herding Cats: Ramping up a social media presence with a ten-facility network
- Social Media Insights from a Solar Observatory

Auditors and Best Practices
2:05pm
Elizabeth Goebels
Join the OIG to discuss past audit results, identification of risk trends and emerging issues, audit coordination, and the resolution of past issues. Includes interactive question and answer session.

Education and Public Outreach (EPO) Best Practices and the Diversification Challenge
3:20pm
Donna Charlevoix, Sue Ann Heatherly, Roxanne Hughes, Jim Madsen, Kristin Roberts & Tim Spuck
This session will focus on best practices in STEM education and workforce development, diversity and inclusion, and building collaborations. EPO professionals from across the NSF Large Facilities portfolio will share exemplar programs and practices, and will work to explore future projects and collaborations.
- Inspiring the Next Generation
- STEM Workforce Development: The Umbrella for Education, Outreach and Communications at an NSF Facility

Tuesday, April 2, 2019 *(continued)*

- Building a Multimessenger Diversity Community of Practice: The IceCube Multimessenger@INCLUDES Initiative
- Broadening Impact through Education and Outreach
- Amplifying EPO through Collaboration: A Story from the NSF Funded Observatories in Chile

*Open Mic Sharathon – *Audience Participation!* Join the discussion with an elevator pitch on your additional programs/projects and best practices.*

Applying the Learning Culture Concept to NSF's Major Facilities Knowledge Management Program
3:20pm
Jose Martens, Virginia Taberski & Rebecca Yasky

This session will be conducted in two parts. The first part will be to develop an understanding of how the NSF Major Facilities Knowledge Management Program functions and the interfaces between NSF and Facilities. As a follow-on to last year's Knowledge Management session, participants in small groups will identify techniques for discovery of best practices and lessons learned within their organization to cultivate the NSF Major Facilities Knowledge Management Program. Each group will share key outcomes of their discussions.

Wednesday, April 3, 2019

EPO, Branding and Communications – Drill Down Hot Topics Discussion – Part I
8:00am
Anne Kornahrens

Participate in a focused discussion and brainstorming session on branding, (re)naming and social media. Will allow for a deep drill into the hot topics that came up on day 1.

Featuring short highlight of "Examining EPO Activities at MPS Facilities," by Anne Kornahrens, AAAS S&T Policy Fellow, serving at NSF in the MPS Office of the Assistant Director.

Business System Reviews – Updates and Practices
8:00am
Rob Hengst, Florence Rabanal & Eddie Whitehurst

This session will provide an overview of the revised Business Systems Guide. Then participants will engage in small group activities to identify experiences and challenges with applying the BSR framework to support the organizational operations, management, and monitoring of Major Facility awards.

EPO, Branding and Communications – Drill Down Hot Topics Discussion – Part II
9:50am
Anne Kornahrens

Take part in a discussion and brainstorming session on STEM, EPO diversification and cross-center collaboration. Will allow for a deep drill into the hot topics that came up on day 1.

Independent Cost Estimates for Scientific Facilities – Approaches and Benefits
9:50am
Denise Castro-Bran, Marc Hayhurst, Matthew Marshall & Vera Scheidlinger

This presentation will discuss the methodology, assumptions, and best practices for performing independent cost estimates (ICEs) for major research facilities either as part of a major upgrade to an existing facility or as part of a new major facility proposal.

Interacting with Congress
12:45pm
Grace Cummings

The plenary session will provide an overview of Congress, its organization and processes, to give attendees a framework to build and maintain support for your programs and an understanding of Congress on par with Congressional Member and staff expectations.

Interacting with Congress Breakout – Part I
1:55pm
Grace Cummings

The first of two one-hour breakout sessions structured as interactive exercises to help attendees prepare for various Congressional interactions, including communicating effectively, recognizing the 3 P's, and utilizing available tools to research different scenarios.

SESSIONS

Lessons from Large Facilities Development and Operation in Remote Environments
1:55pm

George Blaisdell & Christine Lurtz

This session will consist of two parts: During part (1), Christine Lurtz will present on the digital assessment management tools, LiDAR and BIM for design and operations efficiencies. The application of best practice digital tools will be discussed as it pertains to modernizing management of legacy and new infrastructure in McMurdo, Antarctica. In part (2), George Blaisdell will discuss remote infrastructure monitoring and management including use of instrumentation and simple data analysis in creating situational awareness and decision support for infrastructure in McMurdo, Antarctica and Summit, Greenland.

Interacting with Congress Breakout – Part II
3:55pm

Grace Cummings

The second of two one-hour breakout sessions structured as interactive exercises to help attendees prepare for various congressional interactions, including communicating effectively, recognizing the 3 P's, and utilizing available tools to research different scenarios.

The Rise of Privacy: A Risk-based Approach to Privacy Oversight, Compliance & Management for Research Facilities
3:55pm

Mike Cullen & David Ross

A great deal of confusion is swirling around about the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA). With GDPR enforcement in full force and CCPA coming soon, many research institutions, universities, and government contractors are struggling with compliance. This discussion will focus on how to evaluate privacy risks and build sustainable privacy programs using real world examples. Specifically participants will: (1) Gain an understanding of the regulation and its impact on research; (2) Learn to quantify the risk to an institution with multiple privacy and compliance requirements; (3) Better understand data subject rights and how they apply in a complex environment; and (4) Understand the need and role of a Data Privacy Officer (DPO) programs using real world examples. Participants will benefit from a basic level understanding of the GDPR.

Branding, Communications and EPO – the Feedback Loop
8:00am

Ranpal Gill, Anne Kornahrens & Tim Spuck

- Needs that have been uncovered
- Actions that can be taken (What will be done between LFW 2019 and 2020?)
- How will we measure the effectiveness of actions and feed results into further improvement
- Sharing those results at LFW 2020 – the continuous feedback loop…

Defining Science Requirements, Managing Scope, and Ensuring Delivery
8:00am

Tom Gulbransen

To characterize and quantify how our nation's ecosystems are changing, National Ecological Observatory Network's (NEON) leadership established project management methods to communicate and govern Operations across its 81 sites, in 20 regions, performing instrumented and observational sampling, to publish 177 data products. This session highlights project management practices we find to be effective when juggling competing needs of customers, fieldwork, EPO, and cyberinfrastructure.

User Program Practices
9:10am

Joel Brock, Jose Martens, Eric Palm & Lory Wingate

A panel of NSF Major Facilities will provide an overview of their User Programs including their community, services, and challenges. They will discuss performance measurements and how these are aligned with the facility mission and user satisfaction and outreach. Each facility will make a presentation and then the panel will answer questions from workshop participants.

Enterprise Risk Management of Large Facility Projects
9:10am

Stephen Unwin

Large facility projects are exposed to a shifting variety of risks throughout their lifecycles – performance, regulatory, budgetary, research, contracting and political, among others. Key pre-requisites to the effective management of such risks is understanding them and characterizing them. This characterization can be qualitative and it can be quantitative, but what it must always be in order to meet the needs of all stakeholders, including the project management team, is systematic, transparent and defensible. Once the risks are understood and actionable, handling actions can then be developed to reduce the probabilities or the impacts of scenarios driving these risks. This presentation

highlights critical elements of the process for implementing a comprehensive enterprise risk management program, and lessons learned over years of experience in large project risk management.

Project Management and Business Core Competencies for Recipient Personnel
10:40am
Jeff Zivick

This session will discuss future NSF expectations for Recipient organizations to identify Key Personnel who have the qualifications to fulfill a set of core competencies considered necessary for successfully managing an NSF major facility award. Based on input received from the 2018 Large Facilities Workshop, the team approach will be used for meeting the suite of competencies and qualifications and may include a combination of experience, education, training, or certifications. Competencies will also depend on the life-cycle stage of the project (Design, Construction or Operations).

The draft set of core competencies has been developed based on industry best practices and those for agency staff as required by the Program Management Improvement and Accountability Act (PMIAA). As part of this session, attendees will be encouraged to provide feedback to NSF on drafting of this new section in the Major Facilities Guide (MFG).

Supporting US Participation in the International Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC) Expedition
10:40am
Frank Rack

Starting in September 2019, the international Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC) initiative, will begin year-long observations in the high Arctic supported by the German icebreaker Polarstern, which will serve as a central observatory embedded within an extensive, distributed network of deployed sensors and instruments that will drift together across the Arctic Ocean, and when combined with additional airborne and satellite observations and modeling will be used to better understand the evolving Arctic climate system, and the role it plays in a changing global climate. This

talk will describe the international framework and processes for planning the logistics of the project, developing scientific observing teams, organizing scientific contributions, coordinating the use of resources, and ensuring MOSAiC's legacy of data and products, with a focus on the participants and projects supported by the National Science Foundation and other US federal agencies.

Gearing Up for Design and Construction – Discussion with TACC
1:00pm
Tim Cockerill & John West

A Leadership Class Computing Facility is expected to soon enter the Design Stage. The session will include a brief introduction to the Texas Advanced Computing Center (TACC) project and an engaging community discussion on how to build a project team and identify project management resources. Others will be encouraged to share best practices and challenges from their experiences.

Ocean Observatories Initiative, Transition to a New Prime Awardee
1:00pm
Paul Matthias

In late 2018, the Ocean Observatories Initiative Prime Awardee transitioned from the Consortium for Ocean Leadership to the Woods Hole Oceanographic Institution. Lessons learned from the collaborative transition are related to the selection and creation of a Program Management Organization (PMO), knowledge and responsibility transfer methodologies, and subaward management tools and techniques.

Facility Cyberinfrastructure
2:20pm
Ewa Deelman, Bill Miller & Manish Parashar

This session will highlight important recent initiatives in the area of cyberinfrastructure for facilities. Ewa Deelman from USC will present on an NSF-funded pilot project to plan a Center of Excellence in Cyberinfrastructure focused on assisting major facilities. Other updates will be provided on new CI resources and community activities including planning for a follow-on NSF Facility CI Workshop.

SCHEDULE AT-A-GLANCE

Tuesday, April 2, 2019

Time	Topics	
8:00am	**NSF Opening Remarks** *Teresa Grancorvitz, NSF Chief Financial Officer & Matt Hawkins, Head of the NSF Large Facilities Office* **Auditorium**	
8:30am	**Large Facility Spotlight** *Adam Bolton, Scott McIntosh, Mark McKinnon & Thomas Rimmele* **Auditorium**	
9:45am	**Introduction to TACC and NHERI** *Ellen Rathje & Dan Stanzione* **Auditorium**	
10:30am	*Refreshment Break*	
10:50am	**The Role of Education and Public Outreach (EPO) During Construction and Operations** *Amanda Bauer, William Buckingham & Sharon Cooper* **Auditorium**	
11:40am	*Lunch (Vislab & Machine Room Tours for Groups 1 & 2)*	
1:05pm	**Bridging the Communications Gap for Key Stakeholders** *Amanda Greenwell, Adrian Apodaca, John Taber, Ranpal Gill, Shari Lifson, Jennifer Plozai, Cheryl Ann Blain & Claire Raftery* **ROC 1.900**	**An Update on the LFM** *(retitled Major Facilities Guide)* *Matthew Hawkins, Bill Miller, Joy Pauschke, Kevin Porter, Eddie Whitehurst, Rebecca Yasky & Jeff Zivick* **Auditorium**
2:05pm		**Auditors and Best Practices** *Elizabeth Goebels* **Auditorium**
3:00pm	*Refreshment Break*	
3:20pm	**Education and Public Outreach (EPO) Best Practices and the Diversification Challenge** *Donna Charlevoix, Sue Ann Heatherly, Roxanne Hughes, Jim Madsen, Kristin Roberts & Tim Spuck* **ROC 1.900**	**Applying the Learning Culture Concept to NSF's Major Facilities Knowledge Management Program** *Jose Martens, Virginia Taberski & Rebecca Yasky* **Auditorium**
5:15pm	*Transportation to Reception*	
5:30 - 7:00pm	*Networking Reception* *NXNW Restaurant & Brewery Stonelake, 10010 N Capital of Texas Hwy, Austin, TX 78759*	

Wednesday, April 3, 2019

Time	Topics	
8:00am	**EPO, Branding and Communications – Drill Down Hot Topics Discussion – Part I** *Anne Kornahrens* **ROC 1.900**	**Business System Reviews – Updates and Practices** *Rob Hengst, Florence Rabanal & Eddie Whitehurst* **Auditorium**
9:30am	*Refreshment Break*	
9:50am	**EPO, Branding and Communications – Drill Down Hot Topics Discussion – Part II** *Anne Kornahrens* **ROC 1.900**	**Independent Cost Estimates for Scientific Facilities – Approaches and Benefits** *Denise Castro-Bran, Marc Hayhurst, Matthew Marshall & Vera Scheidlinger* **Auditorium**

	Wednesday, April 3, 2019 *(continued)*	
Time	**Topics**	
11:20am	Lunch (Vislab & Machine Room Tour for Group 3)	
12:45pm	**Interacting with Congress** *Grace Cummings* **Auditorium**	
1:45pm	Break	
1:55pm	**Interacting with Congress Breakout – Part I** *Grace Cummings* **ROC 1.900**	**Lessons from Large Facilities Development and Operation in Remote Environments** *George Blaisdell & Christine Lurtz* **Auditorium**
2:55pm	**Shaker Truck Tour** *(Section A)*	*Refreshment and Networking Break (Section B)*
3:25pm	*Refreshment and Networking Break (Section A)*	**Shaker Truck Tour** *(Section B)*
3:55 – 4:55pm	**Interacting with Congress Breakout – Part II** *Grace Cummings* **ROC 1.900**	**The Rise of Privacy: A Risk-based Approach to Privacy Oversight, Compliance & Management for Research Facilities** *Mike Cullen & David Ross* **Auditorium**
	Thursday, April 4, 2019	
Time	**Topics**	
8:00am	**Branding, Communications and EPO – the Feedback Loop** *Ranpal Gill, Anne Kornahrens & Tim Spuck* **ROC 1.900**	**Defining Science Requirements, Managing Scope, and Ensuring Delivery** *Tom Gulbransen* **Auditorium**
9:00am	Short Break	
9:10am	**User Program Practices** *Joel Brock, Jose Martens, Eric Palm & Lory Wingate* **ROC 1.900**	**Enterprise Risk Management of Large Facility Projects** *Stephen Unwin* **Auditorium**
10:20am	Refreshment Break	
10:40am	**Project Management and Business Core Competencies for Recipient Personnel** *Jeff Zivick* **ROC 1.900**	**Supporting US Participation in the International Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC) Expedition** *Frank Rack* **Auditorium**
11:40am	Lunch (Vislab & Machine Room Tours for Groups 4 & 5)	
1:00pm	**Gearing Up for Design and Construction – Discussion with TACC** *Tim Cockerill & John West* **ROC 1.900**	**Ocean Observatories Initiative, Transition to a New Prime Awardee** *Paul Matthias* **Auditorium**
2:00pm	Refreshment Break	
2:20 – 3:50pm	**Workshop Feedback to NSF** **ROC 1.900**	**Facility Cyberinfrastructure** *Ewa Deelman, Bill Miller & Manish Parashar* **Auditorium**

APPENDIX B: PARTICIPANT INFORMATION

NATIONAL SCIENCE FOUNDATION
2019 Large Facilities Workshop
Austin, TX
Tuesday, April 2 – Thursday, April 4, 2019
Participant List

Manda Adams
National Science Foundation

Aaron Anderson
National Center for Atmospheric Research

Giacomo Apadula
BDO USA, LLP

Adrian Apodaca
National Science Foundation

Douglas Backman
University of Central Florida

Suzanne Baron Helming
AURA

Christopher Bashus
UNAVCO, Inc.

Amanda Bauer
LSST/AURA

Michèle Beaudry
Innovation, Science and Economic Development
Canada (Government of Canada)

Jeffrey Berman
University of Washington, RAPID Facility

Cheryl Ann Blain
Naval Research Laboratory

George Blaisdell
Merrick & Co.

Cathy Blough
Gemini Observatory

Paulina Bocaz
AUI/NRAO

Adam Bolton
National Optical Astronomy Observatory

Debra Booth
Florida State University

Sylvie Boucher
Canada Foundation for Innovation

Patrick Breen
National Science Foundation

Jennifer Bridge
University of Florida

Joel Brock
Cornell University

Gustaaf Brooijmans
Columbia University

Bill Buckingham
Kitt Peak National Observatory Visitor Center

Daniel Calabrese
AURA/LSST

Louise Campanale
Grant Thornton

Liang Cao
Lehigh University

James Carson
TACC

Denise Castro-Bran
The Aerospace Corporation

David Catarious, Jr.
Associated Universities, Inc. (AUI)

Dhruva Chakravorty
Texas A&M University

Donna Charlevoix
UNAVCO

Geoffrey Cheeseman
University Corporation for Atmospheric Research

Adam Church
Oregon State University

Brad Clement
Texas A&M University

Timothy Cockerill
TACC

NATIONAL SCIENCE FOUNDATION
2019 Large Facilities Workshop
Austin, TX
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Participant List

Katie Cohen
TACC

Sharon Cooper
International Ocean Discovery Program

Jessica Coral
BDO USA, LLP

Ricardo Correa
Arecibo Observatory

Mike Cullen
Baker Tilly Virchow Krause, LLP

Grace Cummings
Working with Congress

David Curren
Associated Universities, Inc. (AUI)

K Spencer Curtis
BCF Solutions

Celine'de Bourgoin
UNAVCO, INC.

Kathleen Dedrick
Cornell High Energy Synchrotron Source (CHESS)

Ewa Deelman
University of Southern California

Deanna DiGiovanna
National Science Foundation

Jennifer Ditsler
National Solar Observatory

Judy Donato
UNAVCO

Anne Doyle
National Science Foundation

Rachael Drummond
University Corporation for Atmospheric Research

Pratheep Eamranond
TMT International Observatory LLC

Douglas Ertz
UNAVCO

Stephen Ettinger
UNAVCO

Montona Futrell-Griggs
National Science Foundation

Robert Gardner
University of Chicago

Amy Garwood
Columbia University/Nevis Laboratories

Steven Geiger
National Radio Astronomy Observatory

Ranpal Gill
LSST/AURA

Jeffrey Glatstein
Woods Hole Oceanographic Institution

Elizabeth Goebels
National Science Foundation

Alan Gordon
GMTO Corporation

Teresa Grancorvitz
National Science Foundation

Amanda Greenwell
National Science Foundation

Deborah Gronet
AURA

Rich Grubb
OSU RCRV

Vanda Grubišić
National Center for Atmospheric Research

Tom Gulbransen
Battelle

Xiaofeng Guo
National Science Foundation

Rebecca Haacker
National Center for Atmospheric Research

Hannah Hansen
LIGO-Caltech

Mark Hanson
Woods Hole Oceanographic Institution

Jasper Hardesty
Sandia National Laboratories

NATIONAL SCIENCE FOUNDATION
2019 Large Facilities Workshop
Austin, TX
Tuesday, April 2 – Thursday, April 4, 2019
Participant List

Matt Hawkins National Science Foundation	**Nettie La Belle-Hamer** UAF Alaska Satellite Facility
Marc Hayhurst The Aerospace Corporation	**Michele Lacey** TAMU International Ocean Discovery Program
Sue Ann Heatherly Green Bank Observatory	**Patricia Latendresse** Canada Foundation for Innovation
Robert Hengst National Science Foundation	**Krista Laursen** High Altitude Observatory, NCAR
Natalie Henriques TACC	**Shari Lifson** AURA
Andy Howell Las Cumbres Observatory/UCSB	**Pedro Lomonaco** Oregon State University
Roxanne Hughes National High Magnetic Field Laboratory	**Dave Lunger** NHMFL
Rex Hunter National Solar Observatory	**Christine Lurtz** Merrick & Co.
Mike Janus Battelle	**James Madsen** UW-River Falls
Margaret Johnson NCSA - University of Illinois	**Anirban Mandal** RENCI, UNC-Chapel Hill
Timothy Kashmer National Science Foundation	**Matthew Marshall** The Aerospace Corporation
John Kelly SRI International	**James Marsteller** Pittsburgh Supercomputing Center
Bailey Kirby University of Tennessee at Chattanooga	**Jose Martens** AURA
Kathy Kirby Battelle Memorial Institute	**Paul Matthias** Woods Hole Oceanographic Institution
Sophie Knudsen Green Bank Observatory	**Sean Maybee** Associated Universities, Inc. (AUI)
Valerie Koch National Center for Atmospheric Research	**Janet McCord** TACC
Anne Kornahrens National Science Foundation	**Scott McIntosh** National Center for Atmospheric Research
Victor Krabbendam LSST	**Christopher McKay** Battelle/NEON
Michael Kuhlman Battelle Memorial Institute	**Mark McKinnon** NRAO

NATIONAL SCIENCE FOUNDATION
2019 Large Facilities Workshop
Austin, TX
Tuesday, April 2 – Thursday, April 4, 2019
Participant List

Stuart McMuldroch Smithsonian National Physical Observatory	**Matthew Palanza** Woods Hole Oceanographic Institution
Donald McMullen Texas A&M University	**Eric Palm** NHMFL/FSU
William McVeigh National Solar Observatory	**Manish Parashar** National Science Foundation
Kristen Metzger LSST/AURA	**Lori Parrott** Sandia National Labs
Peter Michaud Gemini Observatory	**Deborah Paul** Florida State University/iDigBio
William Miller National Science Foundation	**Joy Pauschke** National Science Foundation
Shree Mishra National Science Foundation	**Chuck Pavloski** Penn State Institute for CyberScience
Anna Lee Misiano National Science Foundation	**Ron Payne** NCSA - University of Illinois
Chris Morrison Gemini Observatory	**Elizabeth Pentecost** National Science Foundation
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NATIONAL SCIENCE FOUNDATION
2019 Large Facilities Workshop
Austin, TX
Tuesday, April 2 – Thursday, April 4, 2019
Participant List

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APPENDIX C: PRESENTATION SLIDES

The following table provides links to the slides used for each workshop presentation. The presentations are organized in chronological order, by date of the presentation.

Tuesday, April 2, 2019	
Presentation	**Link to Slides**
NSF Opening Remarks	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/Opening-Remarks_Grancorvitz-Hawkins.pdf
Large Facility Spotlight	• https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LargeFacilitySpotlight_Bolton.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LargeFacilitySpotlight_McIntosh.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LargeFacilitySpotlight_McKinnon.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LargeFacilitySpotlight_Rimmele.pdf
Introduction to TACC and NHERI	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/IntroTACC-NHERI_Stanzione.pdf
The Role of Education and Public Outreach (EPO) During Construction and Operations	• https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/EPO-DuringConstructionOperations_Bauer2.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/EPO-DuringConstructionOperations_Buckingham.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/EPO-DuringConstructionOperations_Cooper.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/EPO-Handout.pdf
Bridging the Communications Gap for Key Stakeholders – Part I	• https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom1_Apodaca.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom1_Lifson.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom1_Taber.pdf
An Update on the LFM (retitled Major Facilities Guide)	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/LFMupdate_Yasky.pdf
Bridging the Communications Gap for Key Stakeholders – Part II	• https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom2_Blain.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BridgingCom2_Raftery.pdf
Auditors and Best Practices	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/AuditorsBestPractices.pdf

Education and Public Outreach (EPO) Best Practices and the Diversification Challenge	• https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/EPO_Hughes_Roberts.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/EPO_Madsen.pdf
Applying the Learning Culture Concept to NSF's Major Facilities Knowledge Management Program	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/ApplyingLearningCulture.pdf

Wednesday, April 3, 2019	
Presentation	**Link to Slides**
EPO, Branding and Communications – Drill Down Hot Topics Discussion – Part I	No slides were used during this session.
Business System Reviews – Updates and Practices	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BusinessSystemsReview.pdf
EPO, Branding and Communications – Drill Down: Hot Topics Discussion – Part II	No slides were used during this session.
Independent Cost Estimates for Scientific Facilities – Approaches and Benefits	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/IndependentCostEstimates.pdf
Interacting with Congress	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/InteractingCongress.pdf
Interacting with Congress Breakout – Part I	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/InteractingCongressHandout.pdf
Lessons from Large Facilities Development and Operation in Remote Environments	• https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/LessonsLargeFacilities-Remote_Blaisdell.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/LessonsLargeFacilities-Remote1.pdf
Interacting with Congress Breakout – Part II	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/InteractingCongressHandout.pdf
The Rise of Privacy: A Risk-based Approach to Privacy Oversight, Compliance & Management for Research Facilities	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/RiseofPrivacy_Cullen.pdf

Thursday, April 4, 2019	
Presentation	**Link to Slides**
Branding, Communications and EPO – the Feedback Loop	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/BrandingCom_Gill2.pdf
Defining Science Requirements, Managing Scope, and Ensuring Delivery	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/DefiningScienceRequirements.pdf
User Program Practices	• https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/UserProgramPractices.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/UserProgramPractices_Palm.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/UserProgramPractices_Wingate.pdf
Enterprise Risk Management of Large Facility Projects	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/EnterpriseRiskMgt.pdf
Project Management and Business Core Competencies for Recipient Personnel	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/ProjectMgtCoreComp.pdf
Supporting US Participation in the International Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC) Expedition	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/03/SupportingMOSAiC.pdf
Gearing Up for Design and Construction – Discussion with TACC	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/GearingUpforDesign_Cockerill.pdf
Ocean Observatories Initiative, Transition to a New Prime Awardee	https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/OceanObservatoriesInitiative.pdf
Facility Cyberinfrastructure	• https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/FacilityCyber_Deelman.pdf • https://www.largefacilitiesworkshop.com/wp-content/uploads/2019/04/FacilityCyber_Parashar.pdf