Creating a Thriving Workplace

Workshop Report, September 22, 2021

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Table of Contents

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Executive Summary

As a result of talking with NSF Major Facilities (MFs) staff at the 2019 NSF Workshop on Connecting Large Facilities and Cyberinfrastructure (CI) and interviews conducted with MF managers in the spring of 2020, the CI CoE Pilot concluded that MFs have specific needs and experience unique challenges with staff recruitment, retention, and development that are not currently met. As a result, in June 2021, the CI CoE Pilot and CI4Resilience (which explores the impact of the pandemic on MF CI personnel) brought together staff from MFs in a one day, virtual workshop to discuss their experiences and the challenges they face with developing and sustaining a vibrant workforce. This workshop focused on three main MF workforce challenges: working in remote or distributed teams, working in non-traditional environments, and creating a work culture that taps into intrinsic motivations.

The workshop discussed the creative ways MFs are meeting these challenges while making work with an MF attractive to potential hires and worthy of existing staff's continued engagement. For instance, two MF workshop speakers spoke of innovative training opportunities they have designed to strengthen staff development. One is a simulated computing training environment in the States aimed at preparing IceCube staff to work efficiently during their long stays at the South Pole, away from friends and family and the usual day-to-day routines. Those that participate in this training feel more confident and are more successful overall when working at the South Pole. The other is an RCRV program that allows early-career oceanographers to serve on training cruises. This provides them with the opportunity to learn how to best collaborate and communicate with ship operators (the ship's CI professionals). The alumni of this program have reported additional successes in their work as a result of the program.

MFs offer some unique experiences to their staff, providing them with the ability to be a part of something larger than themselves— performing work that has lasting impact on science, society, and the world we live in. Tech companies may not be able to boast opportunities to participate in Nobel Prize winning work. The workshop discussed ways for MFs to leverage their assets, such as providing opportunities for impactful work, to attract new talent and strengthen the fidelity of existing staff.

Finding: MFs present unique challenges in the area of workforce development, often requiring a complex set of inter-disciplinary skills and personal attributes.

Recommendations: 1) The lessons learned and successes reported at the workshop should be shared with the rest of the MF community. 2) **The enthusiastic participation in and response to the workshop has confirmed that future efforts to continue this discussion and tackle these MF-specific challenges is necessary to continue to advance science, engineering, and the cyberinfrastructure that makes the science possible.**

Introduction

At the 2019 NSF Workshop on Connecting Large Facilities and Cyberinfrastructure [1], participants working in MFs came together to discuss a variety of topics related to the management of their cyberinfrastructure (CI). Because people are an integral part of CI—in that they develop it, manage it, and use it to achieve science outcomes—discussions at this 2019 workshop also focused on the importance of and the challenges with developing and sustaining a vibrant workforce. One of the specific goals that came out of that workshop was to continue this conversation and work together to build a stronger CI workforce.

To explore this matter further, the NSF CI CoE Pilot project [2] conducted a series of interviews with managers at MFs to learn about their experiences with hiring, retention, training and mentoring, work culture, rewards and recognition, and personnel attrition. From these interviews, the CI CoE Pilot learned more about how MFs grow and develop their staff, what aspects of their staffing situations appear to resemble more traditional academic research settings, and what aspects tend to differ. From the 2019 workshop and the interviews, we concluded that **MFs have specific needs and experience unique challenges with staff recruitment, retention, and development.**

There are efforts underway to better support CI professionals and researchers dependent on CI. For instance, a recent report published by NSF—*Transforming Science through Cyberinfrastructure: NSF's Blueprint for Cyberinfrastructure Learning and Workforce Development for Accelerating Science and Engineering in the 21st Century* [3]—describes NSF's intentions to develop structures and processes to support more education and training, encourage research institutions to prioritize mentoring and establish "career pathways," and to support professional communities (or networks) such as the Campus Research Computing Consortium (CaRCC), the Great Plains Network, and Cyber Teams. The plans outlined in the NSF report are largely directed toward CI professionals at more traditional academic institutions, however these efforts could be helpful to MFs because many MFs are housed in universities and may receive support from the university's research computing department. But because research computing departments at universities must find a way to meet the needs of faculty from a broad range of disciplines, the CI at their disposal will have been designed to mainly support the most common university use cases. By comparison, any MF's CI would represent an edge case. MFs would need to hire professionals with expertise in "uncommon" equipment, such as telescopes the size of a football field, neutrino detectors buried deep within polar ice, and billion-volt particle accelerators that span tens of thousands of square feet. The CI CoE Pilot was created to provide support to these CI professionals; so to fulfill this mission, **we believe it is important to continue to create a channel for discussion of issues specific to MFs and support them in resolving challenges.**

To that end, the CI CoE Pilot joined forces with the NSF CI4Resilience project [4] to host a one-day workshop on June 29th, 2021 to provide a forum for MFs to discuss staff development and begin identifying ways to address MF-specific challenges. The workshop— *Creating a Thriving Workplace: A conversation about the successes and challenges with building a stellar CI workforce in NSF Major Facilities* [5]—focused on three themes:

- *Working in remote or distributed teams*, because the majority of MFs have geographically dispersed units and must become adept at collaborating and managing their work across time zones, language differences, and culture shifts—all of which can make work more challenging.

- *Working in non-traditional environments*, because many MFs are located in harsh environments (e.g., the Antarctic, around the sites of volcanoes and frequent earthquakes); or require extended work away from home, family, and friends (e.g., aboard ships on the ocean); or are situated in remote locales away from the hustle and bustle of a big city or a buzzing college campus. These environments can make recruitment challenging and can impact the health and well-being of workers as well as their ability to be productive and achieve goals.
- *Creating a work culture that taps into intrinsic motivations*, because MFs provide out-of-the-ordinary experiences and opportunities, including the opportunity to participate in cutting-edge science and being a part of great discoveries.

Organizing Committee

The organizing committee included participants of both CI CoE Pilot and CI4Resilience projects, as well as volunteers from two MFs. They are Joel Brock (CHESS [6]), Laura Christopherson (CI CoE Pilot), Rafael Ferreira da Silva (CI CoE Pilot), Kerk Kee (CI CoE Pilot, CI4Resilience), Angela Murillo (CI CoE Pilot), Jarek Nabrzyski (CI CoE Pilot), Chris Romsos (RCRV [7]), Mats Rynge (CI CoE Pilot), Karan Vahi (CI CoE Pilot), and Wendy Whitcup (CI CoE Pilot, CI4Resilience).

The committee began organizing the workshop in March 2021 by identifying potential topics of interest, and then sent a survey to MF contacts to solicit their ideas and assess their interest in the topics identified. This survey also asked if any MF personnel would be willing to participate in planning the workshop. Two volunteered: Joe Brock, Director of the Cornell High Energy Synchrotron Source, and Chris Romsos, a Systems Engineer from the Regional Class Research Vessel facility. Using the results of the survey, the committee developed the agenda for the workshop, and then reached out to MFs again to ask for speakers who had particular expertise in a given topic area. The committee finalized workshop invitations, other planning and logistics, and hosted the virtual workshop over Zoom.

Participants

Forty individuals participated in the workshop. They included CI professionals from MFs, professionals from related NSF-funded CI projects, and representatives from NSF. Invitees were selected to ensure that at least one representative from each MF was present while keeping the overall group small enough so that everyone in attendance would have a voice in the discussion. See the appendix for a list of registrants who agreed to share their information.

Workshop Activities

Creating a trained and motivated user base for Large Research Facilities and their data

The workshop started with an engaging keynote by Clare E. Reimers, a distinguished professor at College of Earth Ocean and Atmospheric Sciences, Oregon State University, and Project Scientist for the Regional Class Research Vessels (RCRV) project. Drawing on lessons learned from four decades of experience with the US Academic Research Fleet and other ocean science research facilities, Reimers advocated for targeted training efforts, and programs that help the science community better understand the importance of CI professionals and why they are so vital to achieving the goals of science organizations. Specifically, she mentioned the need to help others better understand what is involved with managing these professionals, funding positions, recruiting professionals, and the full scope of responsibilities and risks faced by CI professionals. Reimers is a firm believer that for MFs to be successful, the broader scientific community needs to understand how to maximize their use of MFs, better leverage CI staff, and contribute to the MFs' science mission.

Reimers began her talk by describing her background as it relates to the workshop's overall thrust. She was instrumental in starting the University-National Oceanographic Laboratory System (UNOLS) Chief Scientist Training Program, initiated in 2011 to provide opportunities for early-career oceanographers to serve on workshop cruises. The cruises introduce them to using ship's equipment, teach them how to serve as Cruise Lead, and help them develop the ability to collaborate and communicate successfully with ship operators (i.e., the ship's CI professionals). Historically, 12 ships have hosted these workshop cruises, and, to date, 251 oceanographers have participated. The program has led to a direct increase in oceanographers requesting ship time for their research activities. When the alumni from this program were surveyed about their experiences during and after the program, UNOLS learned that several alumni have since served as Chief Scientists for cruises, have had work published as a result of their work on the cruises, and now feel more confident in planning their own research and training new students in conducting research at sea.

Reimers ended her talk by discussing the importance of data and CI management for the continued success of the Academic Research Fleet. She explained that new software tools are currently being developed to facilitate cruise planning, coordination and data sharing—tools that allow for near real-time quality control and interactive data alerts. One such tool, CORIOLIX (Cruise Observation and Real-Time Interface for Open Live Information eXchange) enables better collaboration between ship-board personnel and their colleagues on shore. CI professionals will need to develop skills with systems like these and be able to adapt and grow their skills as more of these tools are developed. It is and will continue to be increasingly important that curricula for students and training programs for professionals arm their participants not only with the skills to use different equipment and software, but also help to develop the flexibility to respond to an ever-changing landscape of science and technology.

Remote/distributed team work

This panel was facilitated by Jaroslaw Nabrzyski (CI Coe Pilot), and the panelists included Alisdair Davey (National Solar Observatory), John Haverlack (US Academic Research Fleet), David Schultz (IceCube Neutrino Observatory), and Wendy Whitcup (CI CoE Pilot). After a brief introduction, each panelist focused on challenges they've experienced with remote and distributed work and solutions they've found to these challenges. The panel concluded with questions from the audience.

Alisdair Davey talked about the Virtual Solar Observatory (VSO), a project that started in 2002 with the goal of providing a search interface for a variety of terrestrial and space-based observations of the sun. They are a small team of 6-11 members (scientists and programmers) across 7 institutions, in 3 time zones. Challenges with their distributed team have included staff operating independently without coordinating with the entire group, ambiguous management structure particularly for longer-term projects, and working with people from other teams with which you may have little influence. Best practices included staying in touch on a daily basis (e.g., using chat, which is more immediate than email), documenting lessons learned in a wiki, and sharing new information via short presentations and demonstrations.

John Haverlack talked about the challenges the US Academic Research Fleet faces with regard to distributed teamwork. Ships are staffed with 6 people who must coordinate with a CI support person who is onshore. Because bandwidth is limited on the ships, communicating with the onshore staff can be challenging. For instance, it impedes debugging efforts while underway because of the associated latency. They have upgraded their network connectivity on the ships 10 times in 7 years to improve the situation, but the difficulty has not been eradicated. Having more than one option for remote access is key, and they have found that a mesh network is helpful in offsetting communication difficulties.

David Schultz talked about IceCube, which is a global collaboration with staff in many different time zones (the South Pole, the US, Europe, Japan, Australia, and New Zealand). Supervisors tend to reside in the US while developers may span the globe. This makes collaborating and coordinating work challenging. Additionally, most of the work is accomplished via “in-kind” contributions from graduate students, who report to their professors, not a central manager at IceCube. This means that IceCube has diminished ability to oversee or direct this work. IceCube, however, has worked very hard to develop training solutions to best meet the needs of their distributed staff. They offer in-person training to the graduate students a couple of times a year, so they may become more software-proficient, which also benefits them after graduation when seeking permanent positions. They have many virtual workshops, including an introduction to IceCube and the software they have created and used to manage their data.

Wendy Whitcup discussed her background and role as the project manager for the CI CoE Pilot. She shared her experiences building long-distance relationships with MF personnel, and facilitating the work of both geographically distributed CI CoE Pilot team members and MF staff. She also talked about strategies to track the information flow across the team and the MFs served. She briefly described project management tools she uses, such as ClickUp and AirTable, which have been very helpful in this regard.

The Q&A portion proved to be most informative. One question asked about best practices for integrating new members into remote teams. Shultz (IceCube) explained that they hold a boot camp for incoming graduate student workers so they can all onboard together. With full time staff it can be more challenging because then you have to hope there are enough local, experienced staff available to guide the new hires. Whitcup (CI CoE Pilot) added that it is important to allow for small group (i.e., one-on-one and two-on-one) communication to help ease new members into the team. Haverlack (ARF) suggested having new staff be “flies on the wall.” Open up all information and communication channels for them. Copy them on emails, invite them to meetings, and give them access to documentation so they can immerse themselves more quickly into the work and the team.

Finally, Alisdair (VSO) emphasized the importance of hiring people who will fit nicely with the existing team and make sure new hires get to know everyone in a group setting.

Schultz (IceCube) was asked how IceCube handles code contributions from graduate students outside of the US and what happens when the students move on to other positions. Schultz said that they do their best to maintain the code if it is still useful once the student moves on, but sometimes code does "die." The questioner asked a follow-up about whether students tend to reinvent the wheel with their code or are they more likely to build on prior work done by students who have graduated. Schultz explained that there is indeed a fair amount of reinventing the wheel, so IceCube staff continue to discuss how to better maintain the code over time, particularly since these new wheels pile up.

Panelists were asked if they have found a good rule-of-thumb for how often face-to-face meetings are needed in remote work. Haverlack (ARF), a proponent of Agile methodologies, suggested having more frequent and shorter meetings to better facilitate the iterative nature of the work. Davey (VSO) suggested having online meetings daily. Pre-COVID, Davey gathered his staff together for a week every six months, for team-building, relaxation, and fun.

Non-traditional work settings

This panel was moderated by Mats Rynge, with the CI CoE Pilot, and included the following panelists: Ralf Auer (IceCube Neutrino Observatory), Joel Brock (Cornell High Energy Synchrotron Source), Laura Greene (National High Magnetic Field Laboratory), and Christopher Romsos (Regional Class Research Vessels). It began with each panelist briefly introducing themselves and then describing the environment they work in. The session concluded with questions from the audience.

Ralf Auer described the psychological and social challenges for "winter-over" IceCube personnel. Winter-over personnel (called "winter-overs") live and work at the South Pole for 2 months of every year. While there, they update/upgrade the CI and fine tune it for continued use. Winter-overs are required to pass medical and psychological tests before being approved for travel to the South Pole. The site at the South Pole can be lonely, cold, and dark. The South Pole has 24 hours a day of sunlight for 6 months and total darkness for the other six. It takes a very special person to leave home for 2 months of the year, travel to a dark and lonely place, and get the job done without letting the freezing temperatures and isolation get the best of them. To better prepare IceCube staff for this experience, IceCube created an identical environment (sans the darkness and cold) in Madison, WI that allows staff to work with the equipment and processes, develop and test any plans for deployment (because once at the South Pole, other challenges with the equipment will arise due to the cold), and become accustomed to the day-to-day routine so that working with the equipment again won't be as jarring to their systems as the cold and darkness will be after 10 months away.

Joel Brock described the CHESS facility, which is located underground, and because it is a high radiation environment, it is heavily shielded. Staff must undergo specialized training and follow critical safety protocols. CHESS receives about 1,000 visiting scientists a year. Scientists come from a variety of backgrounds, from engineering, biology, and materials science to fields one might not normally expect, such as art and architecture. One of the challenges CI staff face at CHESS is the ability to communicate with and assist so many different kinds of researchers, all arriving at CHESS with different approaches to research, different research goals, and different languages for describing their work. Retaining staff can also be challenging, particularly if their skills are in high demand elsewhere, such as those of radio frequency engineers.

The MagLab, as Laura Greene calls it, is similar to CHESS in some ways. However, instead of radiation, MagLab staff must work with some of the most powerful magnets in the world, which also can be quite dangerous. Like CHESS, MagLab staff must be adept at working with researchers from a variety of backgrounds. Greene reported over 2,000 researchers use the lab from roughly 300 institutions within a given year. The MagLab has training programs that have helped prepare ~300 postdocs and around 7500 graduate and undergraduate students for work in magnetic labs. CI professionals working at the MagLab are expected to straddle three roles: they must conduct research, develop new techniques for magnet use or new magnets themselves, as well as perform user support.

Christopher Romsos described work with Regional Class Research Vessels. Some RCRV staff are devoted to building ships. This requires a very atypical set of skills from that of the everyday information technology professional or computer science engineer. These professionals need to be proficient not only with fundamental engineering know-how (i.e., knowledge of what makes a good design and a sound structure) but must also be on top of the latest in sensor and telepresence technology. Some RCRV staff conduct their work at sea. RCRV vessels spend 180 days per year at sea. Roughly 20 people will live and work together for that length of time. They must be physically healthy and able to withstand being isolated from friends and family. Sometimes these vessels are lucky to attain a 2 Mbps connection with the world, making communication, both personal and professional (such as transferring research data), challenging.

During the Q&A portion of the panel, panelists were asked about their thoughts on IceCube's simulated work environment and how useful this might be at their MFs. Auer (IceCube) said that IceCube has greatly benefited from this. New personnel get up to speed quicker and they feel more confident about their abilities once on site in the South Pole. Brock (CHESS) thought it may be less useful in CHESS' case because CHESS isn't composed of distinct facilities distant from one another, so there isn't as much of a need to prepare staff for a big geographic and context shift. Romsos (RCRV) replied to this question by stating that RCRV does a combination of virtual and on-site training, and each ship tends to be quite different from the next, so designing a single training environment for all ships may not be feasible.

The last question of the session asked panelists how they help their staff stay positive and maintain well-being in non-traditional environments. Auer (IceCube) commented that IceCube provides some training to mentally prepare staff for life at the Pole. Winter-overs also report developing deep and important friendships with their colleagues as a result of their sequestered time together. Auer says there is no recipe for this unfortunately, and a lot is dependent on personalities. Greene (MagLab) said it was important—no matter what the environment (but especially those that take people away from their homes)—to really listen to your staff and communicate with them about how they are adjusting and managing their day-to-day challenges. Brock (CHESS) said his staff are constantly working with the data generated by the synchrotron, so they are at work and around each other a lot. He agreed with Greene that communication was important and stated that, in his experience, most people do quite well adapting to new routines and environments.

Creating a work culture that taps into intrinsic motivations

Andrew Brown, Assistant Program Director of Operational Effectiveness at the University of Notre Dame, led this session on intrinsic motivations. Brown led participants through an examination of the three building blocks of intrinsic motivation: autonomy, mastery, and purpose, as described by Daniel H. Pink in his book, *Drive: The Surprising Truth About What Motivates Us*. The book argues that the problem-solving needed in the 21st-century workplace will only be achieved by self-directed employees who have opportunities to develop their skills and contribute to something greater than themselves.

Brown began the session by describing the difference between extrinsic and intrinsic motivation. Extrinsic motivations are those things that come from outside the self, such as threats of punishment or promises of rewards. In other words, carrot and stick motivations. Intrinsic motivations arise within the self and contribute to a feeling of self-fulfillment. For example, finding a task inherently enjoyable, feeling satisfied because the task was well done, or feeling that the effort was useful or made an improvement in the situation. Brown explained that research has shown that intrinsic motivators are more effective for achieving a more productive and more engaged workforce.

Brown defined autonomy as the freedom to direct one's work, and explained that the level of autonomy that is most comfortable varies from person to person. Mastery was defined as how skillful or adept one is at a particular task. As one might expect, purpose is the reason why you do what you do.

Throughout the session, Brown asked participants to reflect on their own extrinsic and intrinsic motivations. He led them through exercises that helped them explore autonomy, mastery, and purpose further. For instance he asked participants to think about the requirements of a task and how well those requirements must match their skill level to reach a flow state (see Csikszenthmihayli's book *Flow*). Brown asked participants to consider the level of autonomy that was right for them and how they define purpose in their work.

Participants posted their thoughts in online polls, the results of which Brown presented to the group so they could see how alike or different they were from each other in these respects. For instance, Brown asked the group: *In one sentence, why do you do what you do?* Participants typed in their answers and Brown generated a word cloud for the group.

Figure 1: Word cloud generated in response to the question:
In one sentence, why do you do what you do?

Using research findings and everyday examples, Brown explained that feeling you have made progress in your work is a strong motivator. The more progress a person makes, the more likely s/he is to view their work environment positively and feel more satisfied with their work. Brown also explained that setting clear goals, showing respect, and offering encouragement to employees is helpful in keeping them engaged. Lastly, Brown reminded participants that we are all motivated differently, and that it is important to know what motivates each of us in our work and to be respectful of the differences.

Brown closed the session by sharing a quote from Josh Bersin, which summarizes how the building blocks of intrinsic motivation promote a positive work environment. "*While many employers think their goal at work is to 'make people happy,' the reality is that most of us work for a reason: we want to spend our time contributing to others and creating something bigger than ourselves (purpose). This is the core concept behind meaningful work. When the work itself is empowering (autonomy); when we feel we are in the right jobs (mastery); when we feel close to our team (relationships); and when we have enough time and resources to succeed (progress)—we can be happy.*"

Post-Workshop Survey Results

At the end of the workshop, participants were asked to provide feedback by completing a short survey. Nine workshop participants returned the survey. Overall, these 9 individuals seemed pleased with the event. They reported that it was "interesting and pertinent" and that they enjoyed hearing "perspectives from other facilities and individuals dealing with similar issues." Two main suggestions they had for the organizing committee included wanting more time for discussion and more opportunities for interactivity.

The most common types of engagement that virtual events offer participants are usually listening and asking questions. So, virtual events may be relatively passive experiences for most participants. Andrew Brown's use of polls during his intrinsic motivations talk offered participants more opportunities for interactivity. The polls asked for participants' opinions, thoughts, and ideas about various facets of the topic. Interactive mechanisms like polls or games invite participants to create, take action, and contribute to the event. We intend to research other possible ways to invite participants to create and contribute new knowledge so we can employ these in future virtual events.

Future Directions

NSF MFs provide state-of-the-art infrastructure for scientific research and education, such as laboratory and field instrumentation, multi-user research facilities, field research stations, distributed instrumentation networks and arrays, and mobile research platforms. In addition, investment is increasing in highly sophisticated information technology (IT)-based infrastructure, including distributed sensor networks (e.g., NEON), extensive data storage and transmission capabilities (e.g., Open Storage Network), advanced computing resources (e.g., TACC's Stampede2), and cyber-enabled distributed user facilities (e.g. Antarctica or Regional Class Research Vessels), all collectively known as cyberinfrastructure for science. To keep this sophisticated CI running smoothly and evolving over the MF's lifecycle (usually decades), active sharing of best practices in workforce development is needed. We hope that the workshop initiated this very important discussion and will enable the MF community to come together to share ideas and develop sustainable workforce development practices that serve their needs and help them overcome any challenges.

From the very beginning we considered this workshop a "pilot workshop." It was designed to be short and, due to COVID, virtual. It was the planning committee's hope that this event would be the first event in a series, to be used to set an agenda focused on MF needs, and that that agenda would include more focused workshops, working groups, and other activities designed to include participation from a wider audience. The interest in this pilot workshop has confirmed to us that future efforts in workforce development would be of interest to the MF community. Based on the post-workshop survey we learned that MFs desire more discussion and more interactivity around this topic. For any future workshops we develop, it will be important to research and develop other kinds of activities (e.g., polls, games, activities where participants create knowledge) that would put workshop participants more in the center of the conversation and better facilitate the development of an agenda to tackle workforce development issues.

We, as a community, need to decide if such workshops should be continued. Based on the *Creating a Thriving Workplace* workshop, we believe that bringing together key stakeholders from MFs to identify what is working well and to address the greatest opportunities and challenges facing the community is critical to advancing science outcomes. Such meetings, if organized properly, will move the MF community from a group of disparate organizations to a collaborative network that shares ideas and solves problems together, and in so doing, advances the CI that makes science possible, and by extension, advances the science itself. We believe that if NSF MFs, with support from CI Compass [8] (previously, the CI CoE Pilot), work together to identify focus areas with the greatest need and greatest potential for success, and synthesize these into an agenda for moving efforts aimed at improving workforce development forward, we could become a national model for education, workforce preparation, and professional development for science and engineering, and for the US economy more broadly.

References

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8. CI Compass, https://ci-compass.org/

Appendix: Participants

The list of participants below gave permission to list their names in this report. We thank them for their involvement.

Name	Major Facility	Affiliation	Job Title/Role
Alex Olshansky	None	Texas Tech University	Researcher/Instructor
Alice Doyle	US Academic Research Fleet (ARF)	University-National Oceanographic Laboratory System (UNOLS) office	Deputy Executive Secretary
Alisdair Davey	National Solar Observatory (NSO)	National Solar Observatory (NSO)	DKIST Data Center Scientist
Andrew Brown	None	University of Notre Dame	Operational Effectiveness Assistant Program Director
Angela Murillo	None	CI CoE Pilot, Indiana University	Assistant Professor/Program Director
Anirban Mandal	None	CI CoE Pilot, RENCI, UNC Chapel Hill	Assistant Director, Network Research and Infrastructure
Bogdan Mihaila	None	NSF	Program Director
Chad Trabant	Seismological Facilities for the Advancement of Geoscience (SAGE)	Incorporated Research Institutions for Seismology (IRIS)	Deputy Director & Chief Architect
Chaitra Kulkarni	None	Texas Tech University	Graduate Part time Instructor
Charles Vardeman	None	CI CoE Pilot, University of Notre Dame	Research Assistant Professor
Chris Romsos	Regional Class Research Vessels (RCRV)	Oregon State University	Data Presence Systems Engineer
Clare Reimers	Regional Class Research Vessels (RCRV)	Oregon State University	Distinguished Professor/Project Scientist
Dana Brunson	None	Internet2	Executive Director for Research Engagement
David Schultz	IceCube Neutrino Observatory	University of Wisconsin-Madison	Production Software Manager
Eric Palm	National High Magnetic Field Laboratory	Florida State University	Deputy Lab Director
Erik Scott	None	CI CoE Pilot, RENCI, UNC Chapel Hill	CompSci Researcher

Ewa Deelman	None	CI CoE Pilot, University of Southern California	Research professor
Jarek Nabrzyski	None	University of Notre Dame	Director, Center for Research Computing
Joel Brock	Cornell High Energy Synchrotron Source (CHESS)	Cornell University	Director
Karan Vahi	None	CI CoE Pilot, University of Southern California	Computer Scientist
Kathy Benninger	None	Center for Applied Cybersecurity Research, Pittsburgh Supercomputing Center, Trusted CI	Manager of Network Research / Trusted CI MF outreach
Kelli Shute	None	Center for Applied Cybersecurity Research, Indiana University, Trusted CI	Senior Project Manager
Kerk Kee	None	Texas Tech University	Associate Professor
Kevin Thompson	None	NSF	
Laura Christopherson	None	CI CoE Pilot, RENCI, UNC Chapel Hill	
Laura H Greene	National High Magnetic Field Laboratory (NHMFL)	Florida State University	Chief Scientist at NHMFL and Maria Krafft Professor at FSU
Mats Rynge	None	CI CoE Pilot, University of Southern California	Computer Scientist
Matt Schoettler	National Hazards Engineering Research Infrastructure (NHERI) SimCenter	UC Berkeley	Research Engineer / SimCenter Associate Director
Michiel van der Hoeven	NOIRLab		Director of Engineering Services
Miron Livny	None	Open Science Grid, University of Wisconsin-Madison	Professor
Oluwabusayo Seyi Okunloye	None	Texas Tech University	PhD Candidate
Philip Gates	International Ocean Discovery Program	Texas A&M University	Supervisor of IT Support
Rafael Ferreira da Silva	None	University of Southern California	Research Assistant Professor
Steve Barnet	IceCube	UW-Madison	
Tim Cockerill	National Hazards Engineering Research	Texas Advanced Computing Center (TACC)	Director of User Services

	Infrastructure (NHERI) Cyberinfrastructure: DesignSafe		
Tom Gulbransen	None	NSF Office of Advanced Cyberinfrastructure	Program Director
Valerio Pascucci	None	University of Utah	Professor
Wendy Whitcup	None	CI CoE Pilot, University of Southern California	Project Manager
Will Wieder	National Center for Atmospheric Research (NCAR)	CU Boulder	Project Scientist/ Land Model Working Group Co-chair