



**Oppenheimer Science and Energy
Leadership Program (OSELP)**

**Cohort 4 | 2020 - 2021
Think-Piece Summaries**

Cohort 4 Sandia Site Visit | January 2020



17 LABS | 1 COHORT

Oppenheimer Science and Energy Leadership Program (OSELP)

Cohort 4 Think-Piece Summaries

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OSELP

Oppenheimer Science and Energy
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Cohort 4 Think-Piece Summary

***The National Labs Should Be the World-Leaders in Data
Management***

The national labs should be the world-leaders in data management

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We recommend a set of deliberate DOE actions that would transform science by leading in data management. DOE is uniquely positioned to lead this revolution due to their position as frontier generators of complex and diverse data, existing computing leadership, and the ability to tackle problems at scales others cannot. This will increase scientific productivity and knowledge, democratize data allowing the engagement of more scientists, and—most aspirationally—transform the very enterprise of scientific discovery in ways we are as yet unable to articulate.

The (missed) opportunity

Data is the very lifeblood of science, from which we confirm hypotheses and build models of reality. Yet in most communities, data management practices fall short of the rigor we demand in other aspects of research. The DOE hosts a diversity of advanced scientific tools, which are generating diverse data at a prodigious pace. If data management continues to be left as an afterthought, the true value of these expensive datasets will remain unrealized. The 17 labs have the potential to maximize operational efficiency with the ability to learn from data science, honing operations at their facilities. *The DOE is missing out on untold fundamental discoveries and technological innovations, on groundbreaking insights that could have led to Nobel prizes.*

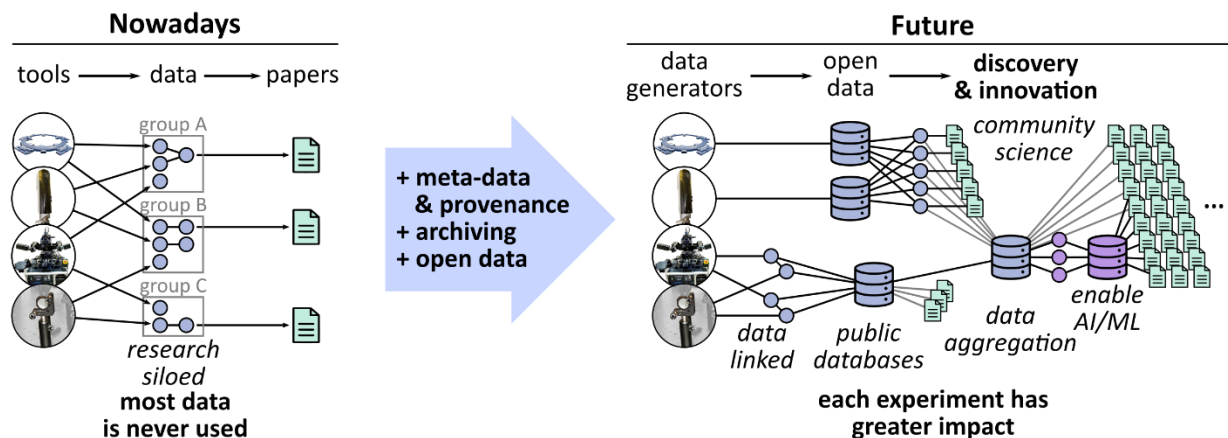
The (potential) impact

Experts in data management from across the complex agree that proper data management could exponentially multiply the impact of a collected dataset. Proper management includes three key elements:

1. Capture of rich **meta-data** about experiments (including provenance) enables data aggregation, automated analysis, enhanced reproducibility, and provides the attribution necessary for researchers to obtain credit for contributions.
2. Long-term aggregated **archiving** increases value, enables data-mining and machine-learning analysis, and avoids wasted experiments.
3. **Open data**, available to all researchers and the public, enables verifiability, enhances quality, and allows far more researchers to analyze datasets.

The case for impact has been made by communities that have embraced these principles. For instance, the Sloan Digital Sky Survey (SDSS) project PIs published ~100 papers, whereas the SDSS open dataset led to >10,000 community analysis papers and growing. This 100x impact multiplier is currently unrealized on the majority of DOE data.

Advanced data management leads to enormous **science impacts** through the acceleration of conventional discovery, as well as the empowerment of new fields of discovery that only arise at the intersection of different kinds of data. Equally important are the **operational impacts**, since efficient management means that each funding dollar or hour of instrument time leads to more innovation and discovery. Democratization of data also serves the interests of **diversity, equity, and inclusiveness**, empowering team science, enabling participation by resource-constrained institutes, and engaging the broadest range of researchers.



The (daunting) challenges

Advanced data management is by no means easy, with three kinds of challenges:

1. The intrinsic **complexity** and heterogeneity of data in a field can be a limiting factor, requiring significant effort to overcome.
2. Common meta-data and archival practices within a community are not established and can be hindered by community **culture** which leads to differences in openness, and attention to standards and meta-data. Community norms arise through history, discourse, and facility policies.
3. **Funding** and policy differences directly influence data management practices. Successful efforts were those that committed significant budget (10–20%) to data activities at the *outset* of the project, as well as providing expert assistance to technical staff to create meaningful data management plans.

The (proposed) path forward

To address the challenges, and position DOE to lead in data management, we recommend policy actions, investment, and technical development at all levels of the DOE national laboratory complex:

Role	Recommended actions
DOE	<ul style="list-style-type: none">● Sec. Energy Advisory Board (SEAB) take up issue● Establish Office of Data Management
Program managers	<ul style="list-style-type: none">● Focused funding: reference implementations, archives● Community workshops to establish common practices, meta-data, nomenclature● Require rigorous data management plans; hold PIs accountable● Encourage facility policies that support open data
NLDC	<ul style="list-style-type: none">● Commit to PEMP notable in advanced data management
Lab directors	<ul style="list-style-type: none">● Appoint Chief Data Officer● Invest in data management, including infrastructure upgrades
Chief Data Officer	<ul style="list-style-type: none">● Define lab needs; own implementation● Act as resource brokers connect PIs to capabilities● Assist with executing data management plans
ALDs	<ul style="list-style-type: none">● Adjust incentives<ul style="list-style-type: none">○ Reward staff for open data, code, standards○ Enable staff to spend time on data stewardship
Technical staff	<ul style="list-style-type: none">● Develop technical approach and standards● Data stewardship workforce owns data over long term

If the DOE commits to these actions, it would become the world-leader in advanced data management, realizing enormously increased impact from sponsor funds, and demonstrating to the world the impact of this approach.

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*The Importance of Leadership Agility at the U.S. DOE
National Laboratories: Lessons Learned During the COVID-
19 Pandemic*

**The Importance of Leadership Agility at the U.S. DOE National Laboratories:
*Lessons Learned During the COVID-19 Pandemic***

June 10, 2021

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The Importance of Leadership Agility at the U.S. DOE National Laboratories: *Lessons Learned During the COVID-19 Pandemic*

June 10, 2021

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Introduction

It has been previously established that there is a strong link between the overall effectiveness of a leader and employee engagement and job satisfaction, an organization's talent retention, and business productivity and financial delivery.^{[1][2][3]} A leader's impact on the aforementioned business critical areas were established to be correlated in the pre-Covid timeframe and would expect to have a higher degree of influence on organizational performance during the current Covid-19 state, as indicated by a recent survey published by McKinsey.^[4] Undeniably, it will take psychology and business professionals some time to garner a complete understanding of the events that transpired during the Covid-19 pandemic and what might be the long- and short-term impact on employees and workplaces, as a consequence of leadership actions and behaviors.^[5]

It is also worth noting that superimposed with the 2020-2021 pandemic timeframe, were tumultuous events (demonstrations and riots) occurring around the nation highlighting the need for greater social justice and racial equality. These events could not be ignored by the national laboratory leaders and staff, and further highlighted the need for leadership to help foster a more communicative, open, and inclusive culture at the national labs.

The pandemic has resulted in significant changes for many DOE national laboratory employees, including the necessity to work from home to a significant level (aka. Teleworking), diminished face-to-face interaction with leadership and teammates, and increasing personal pressure to balance needs of work expectations with home demands (aka. educating children). In most cases employees were largely expected to deliver on program milestones without any schedule relief that could be assigned to the pandemic.

As the Covid-19 pandemic is still ongoing, the authors believe it is worthwhile to capture a topic that has become hyper-relevant and crucial to the success of the DOE national laboratories, especially during atypical times: *leadership agility*. There are many definitions of leadership agility; therefore, it is necessary to define our interpretation.^{[6][7]}

- *Leadership Agility: The ability to effectively lead, manage, and inspire your team during turbulent times and complex situations.*

The focus of this white paper is to disseminate our learnings and recommendations for the institutional attributes necessary to ensure leadership agility, especially based upon our experiences during the significant events of 2020-2021 across the DOE laboratory complex.

This team believes that by incorporating the best approaches utilized and recommended by current leaders and those proven methods recommended by professionals from industry, government, and academia, we can institute meaningful enhancements to how each of the national laboratories currently operate to drive broad improvements in the performance of the lab leadership. Our hypothesis is that these recommendations, if instituted, will have a long-term and sustained positive impact on each of the labs in terms of employee engagement and job satisfaction, talent retention, recruiting, productivity, and program delivery in spite of the current national emergencies, and will help the labs be prepared to handle any future unanticipated challenges, which will require leaders with the skills, abilities, and character to inspire the employees of the laboratory network to deliver for the nation.

Background

To delve into the topic of leadership agility, the team performed a literature review on the subtopics of leadership under stressful and dynamic situations, leadership and relationships, leadership and inclusivity, and

leadership pipeline development. All of this literature was reviewed and analyzed as to its applicability to leadership under the current Covid-19 pandemic and other dynamic situations. The main takeaways and themes from each of the subtopic literature reviews are detailed in the next subsections.

Second, the team interviewed senior DOE, national lab, and academic leaders to get their perspective and lessons learned from their experiences. The main themes gleaned from these interviews were the following:

- *Communication*: Leaders must communicate often, effectively, simply, and explain the “why” of decision making. This gives employees hope and helps create a “safe” environment when under stress.
- *Decisions*: Leaders must consider the big pictures and not be afraid to make mistakes or change a decision when further information is available. Be sure to be collaborative and seek out input from others including opposing views.
- *Self-Management*: Leaders must understand their abilities and limitations. Maintaining composure, recognizing when you are stressed, and finding trusted confidants can help leaders with self-management.
- *Training*: Training leaders for stressful situations can be difficult to do. The biggest influence are role models and other leaders who show what to do and what not to do. Feedback from peers and mentors, and experience in dealing with atypical situations seem to be the best ways to “train” in general.
- *Succession planning*: Leaders must be intentional about planning for their successor and this successor must embody the leadership characteristics and organization demographics. Always looking for someone who is smarter, better, and different than yourself to be your successor is key to good succession planning.
- *Integrity*: Leaders must “walk the talk” and lead by example because stressful situations can bring out the best and worst in people. A mechanism for leadership feedback can ensure leaders are honest.
- *People and Engagement*: If a leader takes care of the employees, they will take care of the mission. Employees want to feel valued, safe, and know what is expected of them.

Reassuringly, many of the key points noted in our interview with leaders were recognized and highlighted during our review of the open literature from academic and psychology experts.

Finally, the team surveyed the current leadership training offerings, classes, programs, and seminars currently available across the laboratory complex. Although these varied greatly across the complex, one common aspect was that none specifically focused on the institutional attributes needed to ensure leadership agility.

Shared Imperatives for high performance leaders

A 2018 *Harvard Business Review* article shared some startling employee survey results related to the performance of leaders under pressure and how workers and organizations were impacted.^[8] The results suggested that many managers have buckled under the pressure of the situation. Roughly half of the leaders were more close-minded, micromanaging, less willing to listen to others’ perspectives, less inquisitive, and more likely to be upset and argumentative (versus calm) when under pressure situations. Furthermore, roughly a third of the leaders were less transparent and more prone to dishonest behavior in these situations. The obvious question becomes what are the documented best practices, behaviors, and learnings noted in the literature, and obtained through interviews with proven professionals, that can help guide current and future leaders to maintain high performance during prolonged stressful and changing conditions - not unlike the Covid-19 pandemic and the high profile nationwide events highlighting the need for greater social justice and racial equality. In this section we highlight several focus areas that were particularly noteworthy from our research.

Know thyself: The ability of a person to handle a stressful situation relies upon the individual’s aptitude to prepare themselves mentally, physically, and emotionally.^[9] Stressful situations can be categorized by neuroscience concepts as those that are “exteroception” (sensitivity to stimuli from outside of the body) and “interoception” (sensitivity and awareness to stimuli from inside the body).^[10] The ability for a leader to recognize their own physiological state and conditions, is thought to be tied to emotional resilience, which in turn helps the leader adjust and cope with difficult situations.^[11] When looking at how leaders perform under stress, it was found that leaders in the topmost positions of their organizations seem well prepared compared to lower level managers.^[12]

Serve as a model to the team: During difficult times employees will naturally look to their leadership to serve as an example of what is expected. Leaders need to consistently serve as that role model and do, not just say, what they are asking others to do. Failure for a leader to follow the rules all were asked to follow can only lead to a loss of respect from employees, and the converse is true as well.^[13] Leaders' external behavior towards others as demonstrated by impatient, fearful or frustrated expressions or communications will be recognized by their team members, and result in a team's heightened apprehension.^[9] This could in turn result in an increase in the team's stress and reduce their performance. The ability of a leader to demonstrate a calm mind frame so they can step back from the pressure of the moment to respond with a more clear and thoughtful communication to the team, versus an instinctual reaction, is likely to have a calming benefit.

Communicating with the organization: Regular and clear communication to organizations and individuals shows that leaders are maintaining a close understanding of the situation. Effective leaders will share what they know and admit what they don't know. Communication that is direct, frank, honest, but bounded with some level of confidence and optimism, will be more credible, believable, and encouraging to team members, than having a leader display an unsupported extreme level of self-assurance.^{[13][14]} Employees need to hear from leadership at town-hall type activities so they can get the latest understanding of the current situation from their leader, as well as share some of those things that are keeping them up at night. Additionally, during these discussions it is paramount that a leader can regularly articulate the importance of the team's work to provide a higher meaning to employee efforts.

Leadership style: Studies have found that abusive behavior of leaders can result in both stress and burnout for their direct reports. The study showed that using transformational leadership at a higher level resulted in reduced levels of burnout and emotional exhaustion for the employee.^{[15][16]} Utilizing a transformational leadership model in working with and managing direct reports continues to be found to have advantages, and this is especially true over the last year. Also, an empathetic leader is needed, wanted, and perceived as a better leader under stressful situations. Along these lines, a charismatic leadership style is also more effective in dynamic situations.^[17] However, there are caveats to a charismatic leadership style in that extraversion and openness are seen as good, but agreeableness can be seen as a negative.

Decision making and utility of teams: During crisis management, it is key that leaders involve the pause-assess-anticipate-act cycle. After consulting with trusted sources, leaders do need to take decisive action. Depending on the situation, the implementation of a network of teams can be more effective than a top down and strong command and control approach from a small set of leaders.^{[18][19]} In an unanticipated crisis with a high level of uncertainty, leaders must face and respond to challenges that are poorly understood and be empowered with the authority to make decision in specific areas, with the realization that mistakes could occur. Collaboration across different teams should be encouraged, as well as transparency across the network of teams.

Character in a crisis: In routine emergencies, experience may be the most valuable quality for a leader, but in high stress situations, character (or gap in character) will also be elevated through people's actions. Studies have shown some correlation between job pressure and increased unethical behavior by leaders and employees.^[20] A leader must be motivated and have a clear purpose that guides their decision making. As the team has experienced many challenges during prolonged crisis, the value of celebrating small victories and success stories should not be minimized, since these can help to lift spirits for both leadership and all employees and highlight the impact of everyone's efforts, and benefit the entire organization.^[21]

Developing Trusting Relationships with your team and staff

The Covid-19 pandemic has led to increased levels of anxiety, depression, grief, fear, and stress among staff, including among leaders. The shared fear has led some colleagues to become closer, more "intimate," but has increased the need for psychological safety (i.e., absence of interpersonal fear). This fear and anxiety combined with a complete change in work and life routines have resulted in different priorities for employees in the post-pandemic world than before the pandemic.

Leaders should prioritize building trusting relationships, social cohesion, and purpose among their team. An opportunity to build trust is to increase the frequency of one-on-one communications to connect to people on a personal level, ask them how they are doing and how you can help. Leaders should facilitate group communications to give people a sense of social cohesion. Continue to reiterate the mission of the group and

their role in it to ensure the team has a sense of purpose, and ensure roles and responsibilities are clear. Leaders should recognize a bias toward control being a natural response to crisis, such that reaffirming peoples' roles becomes even more critical. Be intentional, scheduling time to work on these things.

Being sensitive to how different employees feel and tailoring your message is an imperative during turbulent times.

- Employees feeling confused: give them facts and clear instructions,
- Employees feeling worn down: give them clarity on long term plans, positive stories, and chances to connect,
- Employees feeling sense of loss: give them a new vision for the future and a chance to grieve.

Trusting relationships between leaders and teams is paramount in any circumstance to produce high performing teams. However, the ability of leaders to build trusting relationships is more readily apparent and critical during turbulent times with complex and fluid situations, such as during the national labs 2020-2021 experiences. Leaders who have not already demonstrated the ability to build trusting relationships with their teams through effective communication, personal connection, and candor in normal times are unlikely to develop this ability during a stressful period. In order to prepare leaders for prolonged dynamic situations and resulting stressful times, during normal times Labs should ensure leaders are prepared to:

- Establish Credibility: Communicate more than they think they need to – transparency, honesty, and reassurance is important to build relationships,
- Build Closeness: Assess each employee's emotional needs and respond to each employee with a high level of emotional intelligence,
- Act with Compassion: Effective leaders are in tune with how their teams are feeling based on what they're experiencing. Leaders must also be able to show emotional vulnerability (when appropriate) to their teams in order for their teams to respond in a reciprocal fashion and to communicate openly.

Inclusion provides the basis for leadership agility and organizational resilience

The 2020-2021 pandemic brought many challenges to the DOE national lab complex; these challenges were amplified by concurrent national discussions on the role of diversity, inclusion, and equity across society, with some focus on training within the labs. The team explored how a culture of inclusion might support leaders in particularly dynamic periods of national crisis. In our literature review and in conversations with leaders, we found inclusive cultural attributes provide a strong base for leadership agility and organizational resilience. Additionally, we find that times of crisis provide an opportunity to practice and strengthen inclusion in workplaces.

McKinsey's research has shown that diversity can help organizations increase innovation, reconsider entrenched ways of thinking, and improve financial performance.^[22] Organizations can take full advantage of the perspectives of a diverse workforce only if leaders and employees enjoy a sense of inclusion. McKinsey defines inclusion as, "the degree to which an individual feels that their authentic selves are welcomed at work, enabling them to contribute in a meaningful and deliberate manner."

Amongst the various approaches to building an inclusive culture, these practices pay off during a crisis:

1. Build more representative teams by setting rising targets for underrepresented groups and tracking performance recruiting and promotion processes. Appoint "bias-watchers," respected leaders who are trained to call out unconscious bias in talent-related discussions. In a crisis, not all employees will have the same experience; a culture of representative teams will assure the diversity of experiences are considered by leadership.
2. Include all employees in conversations about inclusion. Many organizations have "Allies" programs to encourage all employees to help combat microaggressions; such "ally" relationships will be invaluable during times of turmoil.
3. Leaders adopt and model inclusive behaviors such as hosting open and honest conversations about people's unique identities; calling out microaggressions when they see them; and creating opportunities

for connectivity, which can improve retention. These personalization and engagement actions are critical for a basis of trust during a crisis.

4. Commit to education on diversity, inclusion, and bias by attending trainings and reading the latest research, just as leaders would approach any other core responsibility at work. A practice of learning and adapting is the very definition of agility.

During a crisis, a culture of inclusive leadership can address immediate employee needs by building on trust. Leaders can take these four actions to build on existing trust:^[23] Make it credible (listen to your people; communicate regularly); Make it feasible (prioritize timely action rather than waiting for transformative solutions); Make it sustainable (develop a plan to embed changes beyond the crisis); and Make it personal (Find creative ways to put employees in charge of their own journeys. Not everyone's experience is the same, so leaders will need to tailor their response.)

The oft-forgotten irony of crises is that an organization's culture of inclusion can actually be strengthened during a crisis.^[24] The increased rate of change and need for constant communication provides many touchpoints that leaders can utilize for longer-term inclusion gains. Working through a crisis provides a unique platform to emphasize and reinforce the institution's purpose by connecting people to something bigger than themselves and helping them contribute more fully. Building new approaches for collaboration that will persist beyond the immediate, while nurturing curiosity and learning establishes new connectivity and emphasizes a philosophy of community. Finally, assuring that new policies promote equitable treatment of all workers, while creating conditions for workers to speak up and confidently make professional concerns and personal needs known, makes visible an institution's stated goals of inclusion.

Weaving learnings into leadership development, training and succession programs

Succession planning is a critical element of leadership agility. Human capital is more important than ever, with fewer physical boundaries for the future workforce, and will be the primary factor in sustaining competitive advantage. Continuity in leadership is vital in facilitating the development of long-term objectives and even more relied upon during a significant event or crisis. Perhaps most importantly, an enterprise must maintain resilience against unanticipated turnover or events, so that no single person or small group of persons constitute an irreplaceable consolidation of experience or knowledge fundamental to the ongoing interest of the organization.

We studied recommended practices for succession planning using several different avenues. These included researching academic journals and professional society publications, hearing first-person perspectives from senior leaders within the DOE complex (including past and present lab directors), and performing interviews that included a critique of observed practices (both commendable and poor) as well as experiential-based suggestions for improved succession planning outcomes.

First, succession strategies are a requirement for any best-in-class organization and are not optional. This was the unanimous opinion of those interviewed, as it was uniformly endorsed as a best practice for organizational resiliency. Next, the succession planning process should be formal, systemic, systematic, tailored, and experientially-based. It should not be resigned to a once-a-year replacement review cycle for the highest managerial levels of the organization. Instead succession *management* should be employed, not merely being replacement planning,^[26] so that beyond identification of successor candidates, development objectives and timelines with applicable mentoring are established and tracked for all levels of leaders. Basing the readiness of a successor on experiential targets/goals obtained is wholly encouraged and leadership in the midst of a crisis affords a seldom available proving ground for confirming higher leadership potential or further goal development. Finally, a best practice is to weave succession management into regularly occurring strategic planning sessions, as central to the firm's operational continuity as a product or service portfolio.

Recommended Actions

As the national lab complex moves forward in the post-pandemic work environment, likely with highly expanded remote work, each lab should consider how our existing leadership training, D&I perspective, and communication norms need to be consciously adapted to ensure our leadership is agile and prepared for future unexpected events with strong, inclusive and high performing teams. Based upon the research and learnings in

this report, it is imperative that the following elements of leadership agility are in place and emphasized on an institutional basis. In order to achieve these attributes on an institutional basis, we recommend the following actions should be followed.

- *Shared Leadership Imperatives:* The guiding principles behind leadership imperatives tying into leadership agility include knowing your leadership style, communicating effectively, seeking regular and direct feedback, and paying attention to self care. To achieve these principles, the national labs should put the following actions in place.
 1. Organizationally define and expect universal core leadership behaviors for team members. These would clearly capture the needs for behavior-based expectations (the “how part of leadership”), and not just an outcome-based approach to defining a successful leader.
 2. Assess leadership effectiveness through annual 360 degree survey. These anonymous annual surveys might include the following areas: Leader Courage; Integrity and Trust, Communication; Owner Mindset (value creation and program delivery); Protecting People, Community, and Environment; and Respect for People and Team. The results of the survey provide each leader with an opportunity to examine areas needing improvement and those areas that are strong, and further tailor their development plan. Furthermore, at an organizational level, senior leaders will be able to understand the development needs for specific staff and help address areas of common institutional concern across the lab.
- *Trusting Relationships:* Trust is the foundation for most effective and long-term relationships. It is equally important for there to be solid trust between a leader and their staff. The following recommendations help leaders recognize their blind spots pertaining to soft-skills and help the national labs attract and retain talent, while delivering on the missions.
 3. Utilize the Harvard Business Review emotional intelligence assessment to help determine blind spots for both individual leaders and the organization as a whole. This online survey is free and can be located here: <https://hbr.org/2015/06/quiz-yourself-do-you-lead-with-emotional-intelligence>. After the leader completes the survey, a score and report are produced. The leader should reflect on their reported emotional intelligence, but the full benefit can be gained by having the self-perception results compared with someone else’s perspective, via completion of the survey as framed from the other person’s perspective. The leaders would pick a trusting colleague with whom they have an open and honest relationship. After survey completion, the leader has a private discussion with that person to compare the results and discuss potential reasons for incongruence.
 4. Demonstrate trust in workforce by piloting, then implementing, options that provide desired work location flexibility. Over the last 16 months many of the national laboratory employees have been able to demonstrate their ability to effectively deliver on their responsibilities and commitments, in spite of limitations to being onsite daily and taking on the added homelife demands due to the schools being closed, for example. As the national labs resume more normal operations, consideration for flexible work arrangements should be given to staff who can successfully achieve mission objectives irrespective of work location. Furthermore, the ability to have select functions work some part remotely will be seen as an added benefit and could help with talent attraction and retention.
- *Systemically-inclusive Culture:* The guiding principles behind how an inclusive culture ties into leadership agility include developing policies and practices that make inclusion systemic, committing to education on diversity, inclusion, and bias, expecting and modeling inclusive behaviors, building representative and diverse teams, and ensuring diverse voices are heard. In order for the national labs to achieve these guiding principles, the following actions are needed.
 5. Provide and utilize multiple paths for direct feedback to lab leadership. This includes providing means for employees and leaders to provide feedback about anything through surveys, councils, and trusted confidants. All employees should feel their voice is heard.
 6. Always act on credible feedback received and communicate why an action was not taken. This should always be expected. It is not enough to receive the feedback with no action. All should feel their voice is heard and some action is taken, even if that action is an explanation of why no action was taken.
- *Leadership Development Ethos:* The guiding principles about how a leadership development ethos leads to leadership agility are to prevent single points of failure, develop short-term and long-term succession

strategies, and to take advantage of high stress scenarios. The strength of the DOE national lab complex lies with its workforce. In order for the laboratories to be resilient, it is critical that succession management play a central role in the evolution of the science pursued at the labs. A key action that encourages leadership agility is the following.

7. Utilize crisis situations and special projects to identify emerging leaders with desirable core leadership behaviors and provide aspiring talent with leadership opportunities. Never waste a crisis. Succession management is key to supporting the development of all leaders. This includes having a centralized tracking mechanism of clear competencies for each leadership role, not letting hiring practices get in the way of long-term succession strategies, and utilizing performance appraisals to turn into development actions on performance plans.

Summary

In summary, we return to the definition of leadership agility: *The ability to effectively lead, manage, and inspire your team during turbulent times and complex situations*. The success of the DOE national laboratory complex of achieving and delivering on their national and global mission certainly hinges on employing and retaining agile leaders, both now and in the future. As we have learned throughout 2020-2021, the nature of work and the national collective emotion and environment will always have times of instability. The recommendations given herein serve to enhance and provide a pathway for developing and maintaining an agile leadership environment by focusing on shared leadership imperatives, trusting relationships, systemically-inclusive cultures, and leadership development ethos. We believe the items recommended can only result in the national labs maintaining their ability to retain and attract the best talent in the nation so that the Department of Energy's missions can be successfully achieved.

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OSELP

Oppenheimer Science and Energy
Leadership Program (OSELP)

Cohort 4 Think-Piece Summary

***Pipeline and Recruitment Strategies at Department of Energy
National Labs***

Pipeline and Recruitment Strategies at Department of Energy National Labs

*A Think Piece compiled by members of the
Oppenheimer Science and Energy Leadership Program Cohort 4*

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June 2, 2021

DRAFT

Executive Summary

This think piece focuses on innovative pipeline, recruiting, and workforce development programs that are currently in place at DOE National Laboratories. These programs will continue to be responsible for fostering a healthy workforce for years to come, and therefore are critical to supporting DOE mission scope. The main product of this think piece is a “menu of options” highlighting a number of unique programs that we discovered during our research into this topic. For long-term strategies and partnerships, we surveyed K-12 STEM programs, higher education partnerships, community college technician pipelines, and programs identifying future workforce needs. For entry-level lab programs, we identified unique approaches to student internship programs, postdoctoral programs, and technician apprenticeships. Finally, for recruitment of career staff, we studied current recruiting and hiring practices. This white paper will be disseminated to a broad audience related to workforce development and recruitment throughout the lab complex. Our goal is to facilitate the national labs learning from each other about the innovative programs that they have developed.

This background research led to several tactical or short-term recommendations that DOE labs can take advantage of in order to enhance pipeline and recruitment strategies.

1. Connecting programs within a lab tends to improve outcomes.
2. DOE-wide umbrella organizations help push all labs to do better through sharing of innovative approaches.
3. Success at workforce development reflects investment by the laboratory.
4. Diversity is a critical component of workforce health.

We also propose a more strategic or long-term recommendation for a “DOE Academy”. While many current laboratory efforts are successful, we feel that a holistic DOE-wide resource and effort would bring scale to bear for greater impact, avoid duplication of effort and, most importantly, help share the innovative solutions that individual labs have successfully developed.

Motivation - A discussion of why innovative programs are critical for DOE workforce development

The DOE National Labs rely heavily on attracting quality talent to fulfill their mission scope. One fundamental characteristic of the labs is the fact that a large percentage of the staff is comprised of long-term national lab system employees. In addition, approximately 40% of the national lab workforce is eligible to retire in the next five years¹. Therefore, it is vital to identify successful strategies for improving recruiting at the national laboratories in general. Our focus in this think piece is on recruitment models intended for development of pipelines that lead directly to the national lab system (both scientific and technician staff), including universities, community colleges and technical schools. To further a diverse and inclusive workforce, this effort includes suggestions on reaching out to minority groups such as the Grace Hopper Society, the Society of Women in the Physical Sciences, the National Society of Black Physicists, as well as historically black colleges and universities (HBCUs) and other predominantly minority organizations.

Every national laboratory has a strategy for recruitment that focuses on different aspects, including K-12 activities, university partnerships, fellowship programs, society engagement, and apprenticeship programs. Our research indicates that all labs are doing well in some areas but are struggling in others. ***Our goal is to facilitate the labs learning from one another so that all labs can enjoy more success in this area. This white paper highlights some of the innovative programs and unique solutions that individual labs have developed to deal with pipeline strategies, recruiting and hiring techniques, diversity and inclusion programs, and future workforce needs.***

This think piece is inherently long-term in its vision to facilitate a consistent recruitment strategy for the national lab system. However, there is also a short-term impact to recruitment due to the COVID-19 pandemic, which is modifying pipeline and hiring processes throughout the country. For example, summer student programs are generally a major contributor to recruitment strategies for the labs, and many have been put on hold or are operating virtually in 2020 and 2021. This document primarily focuses on long-term pipeline strategies, but also addresses some of the pipeline challenges that are unique to the pandemic era. In addition, this think piece has strong ties to concepts of national lab branding, leadership, retention, and other issues presented in several of the other OSELP Cohort 4 think pieces.

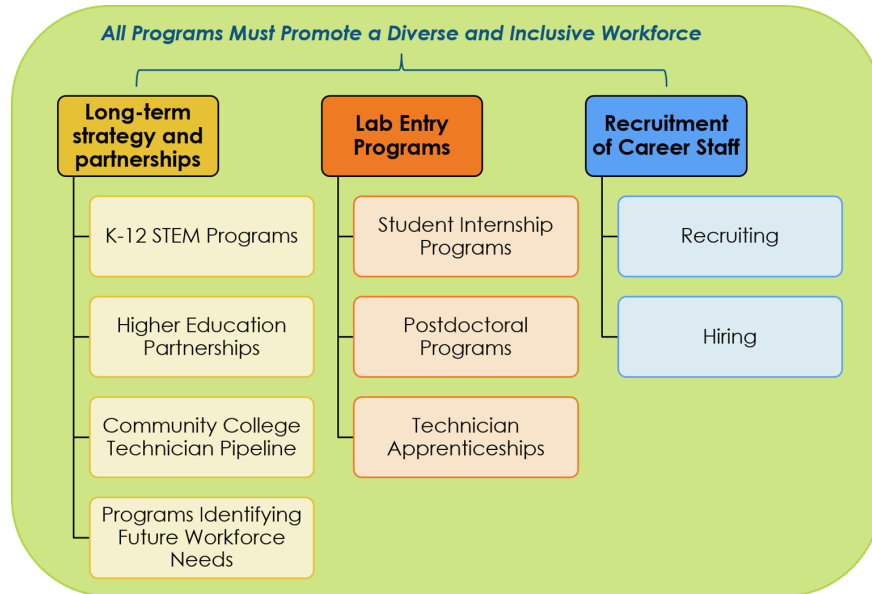
This white paper is intended for a broad audience of DOE laboratory staff who are interested in improving upon current pipeline and recruitment strategies. We hope that the menu of options we present here may lead to an increased awareness of innovative workforce development programs throughout the complex.

¹ “Energy Workforce Opportunities and Challenges,” Congressional Testimony to U.S. House Appropriations Energy & Water Subcommittee, February 2018.

Background - Our approach to the problem and research methodologies used

Research for this white paper included a combination of surveys, interviews, and discussions with all seventeen of the national labs in order to identify what works and where common areas of struggle exist. We include “solutions” from labs that are doing particularly well in certain areas. In addition, we identify a path forward for common areas where some labs struggle. The ultimate goal is to help connect efforts across the lab system.

The pipeline and recruitment problem was broken down into three main areas shown below:



In most of the above areas, diversity and inclusion were considered and are reported on below. One of the most striking aspects of our research was that interconnections between the above programs and management at a lab-wide level seemed to provide the highest benefit. Some of the most innovative solutions involved partnerships not only between these programs, but also between similar programs at the DOE-level. Examples of these best practices are captured in the next section.

Our team began by using a survey to gather information on the above areas from each of the labs. We chose to survey the entire OSELP cohort, and in some cases, the cohort members referred us to experts at their labs. The survey included a series of ten questions on recruiting, hiring, pipeline, and future workforce strategies, as well as a section listing points of contact for various programs in these areas. The survey questions are documented in Appendix A. Survey results were compiled and used to identify programs at specific labs that are particularly innovative and successful. Virtual interviews were set up to learn more about the most intriguing efforts. In total, we performed 13 interviews with experts across 7 labs. In addition, we were able to gather information from a number of in-person and virtual site visits that the OSELP cohort participated in throughout 2020 and 2021.

Highlights – A menu of best practices for pipeline development and recruitment

The following sections present highlights of the unique programs we learned about during our research for this think piece. For each area, we list programs that contribute to success at multiple laboratories, along with the names of the labs from which we heard about these programs. **We emphasize that these lists are NOT exhaustive!**

There is an important caveat to this think piece report. Our research was targeted and not fully comprehensive, so we have not identified every instance of a particular program across all 17 DOE labs. We also list a number of standout programs at specific national labs, and again, these should not be interpreted as comprehensive. Through our surveys, interviews, and virtual visits, these are particular examples that were impressive in their success, scope, and organization. If you have an innovative program at your lab that we missed, we would love to add it here! This document will be updated as necessary.

K-12 Programs

- **Programs in place at multiple DOE labs**
 - **Local student lab visits** – Many labs invite students on site annually, but some have particularly strong programs. (Examples include BNL, which hosts 30,000 K-12 students on site annually and now tracks where these students end up, and Fermilab, which hosts 100,000 K-12 students on site annually, which is facilitated by open access.)
 - **STEM competitions** – Most labs engage in STEM-based competitions either on or off site. Activities include middle and high school science bowls, bridge and vehicle building, elementary and middle school science fairs, robotics, computing, and Hour of Code programs.
- **Standout programs at specific DOE labs**
 - **Learn. Do. Earn. In Nuclear.** – An INL-produced tool to educate parents, high school career counselors, and students about the range of nuclear field jobs in the state, salaries, degrees needed, and which state schools offer those degrees.
 - **The Interactive Plasma Physics Experience (IPPEX):** a PPPL virtual environment to operate a tokamak and control remote tabletop plasma discharge experiments.

College and University Partnerships

- **Programs in place at multiple DOE labs**
 - **Building relationships focused on long-term sustainability** – Programs that help connect university faculty and lab researchers and build collaborative research such that future students in that faculty's lab will have natural connections with the lab.

There is also a focus on sustainable programs that have a broader impact. (Examples investing in these programs are INL and BNL.)

- **Joint PhD programs** – Joint education programs with labs and universities allow students to work on their degrees at the lab. (Examples include NREL, which has collaborations with several Colorado universities, and Jefferson Lab, which has sent 1/3 of all U.S. nuclear physics PhDs through its programs.)
- **Joint faculty programs** – Faculty/staff joint appointments provide another bridge between lab and university in which appointees have responsibilities at both a university and a lab. (Examples include SLAC and Ames Lab.)
- **Graduate Fellowships** – Lab-based student fellowships offer students the opportunity for a structured graduate program bridging lab and academia. (An example is INL.)
- **National Fellowship Programs** – The SSGF (NNSA-sponsored Stockpile Stewardship Graduate Fellowship), GRFP (NSF-sponsored Graduate Research Fellowship Program), and others are strong national programs that include on-site research at DOE labs and provide opportunities for sharing work at conferences and career fairs.
- **PSAAP centers** – The Predictive Science Academic Alliance Program provides collaborations between NNSA labs and university centers that allow students to work on mission-relevant problems. (LANL, LLNL, and SNL collaborate with PSAAPs.)
- **Standout programs at specific DOE labs**
 - **CAES (Center for Advanced Energy Studies)** – A leading consortium at INL comprising all four regional research universities to create a pipeline and other win-wins between labs and academia (research, education, innovation). Includes programs such as the Summer Visiting Faculty Program (where faculty from local universities can spend a summer doing research and mentoring), NSF REU internship funding, joint certificates tailored to the lab’s needs, and much more.

Programs Identifying Future Workforce Needs

- **Programs in place at multiple DOE labs**
 - **Use of data for hiring and detailed diversity statistics** – Some labs track detailed hiring data for diversity and other purposes. (JLab)
 - **HR partnerships** – Several labs mentioned that HR partners with ALDs and division leaders to make a hiring plan for out-year needs.
- **Standout programs at specific DOE labs**
 - **CAES (Center for Advanced Energy Studies)** – This INL center focuses on the development of the energy workforce, offering reverse joint appointments at universities, student competitions, as well as certificates in areas not generally taught in schools (like cybersecurity, non-proliferation).

- **Report on workforce projections in nuclear energy** – This INL program connects multiple organizations across the region. It may be able to improve lab-wide/DOE-wide focus on new strategic areas like AI, machine learning, quantum, and new skills/programmatic areas.
- **Statistical analysis for labor demand** – This INL program assesses the workforce demand in particular technical areas based on aggregating statistics. The program is run by a labor economist.

Student Internship Programs

- **Programs in place at multiple DOE labs**
 - **Integration between HR and Education Program Office** – Collaboration between HR and educational programs increases awareness of internship opportunities and streamlines hiring processes. (Examples using this approach are BNL.)
 - **Integrated student programs** – One integrated program through the laboratory streamlines the processes involved in recruiting and hiring students. (Examples using this format are LANL and BNL.)
- **Standout programs at specific DOE labs**
 - **Office of Educational Programs** – BNL's program office integrates K-12, undergrad, grad, and postdoc programs in one very cohesive and coordinated program. This facilitates connections between programs and helps to bring people through the whole pipeline. It also includes a visiting faculty program. A key is the well-staffed office with 14 staff. BNL has developed a suite of programs for every grade level from 1st through graduate level. They host high volume at the early grade levels and as the science gets progressively more complex, they host upper grade levels in authentic science activities using BNL facilities and mentors, as well as trained teachers. Internships at the high school level and the teacher/student research programs seed undergraduate internship programs.

Postdoctoral Programs

- **Programs in place at multiple DOE labs**
 - **National Lab Postdoc Forum** – Started by LANL postdoc program lead Mary Ann With, this program stemmed from the National Postdoc Association. It has developed a postdoc program resource guide for all DOE lab postdoc programs to use, and it hosts an annual virtual meeting. (Participants are LANL, LLNL, Sandia, ORNL, Savannah River, Ames, Argonne, BNL, LBNL, PNNL, INL, and NREL.)
 - **Postdoc program activities** – A range of activities designed specifically for postdocs, including research slams, holiday parties, postdoc poster symposia, summer events,

- brown bags, writing seminars, and invited speakers. (Examples include LLNL, LANL, PNNL, LBNL.)
- **Named postdoc fellowships** – Used for recruiting into more prestigious postdoc positions. (Examples include INL, BNL, SNL, LLNL, LANL, SRNL, SLAC, PPPL, PNNL, LBNL.)
 - **Standout programs at specific DOE labs**
 - **Career development programs for postdocs** – At LLNL, institutional funds support postdocs at the 25% level for career development, which can be used to attend conferences, finish writing up papers from the postdoc’s previous position, and attend training, tours or seminars, even if they are not directly relevant to employee’s projects.
 - **Integrated postdoc program** – One program and process throughout a laboratory contributes to a consistent approach, as is done at LANL. The program is integrated with HR for quicker turnaround and provides a standard application and evaluation procedure.

Technician and Technologist Apprenticeship Programs

- **Programs in place at multiple DOE labs**
 - **Technician and Technologist Apprenticeships** – A number of labs feature technician and technologist programs that capitalize on a symbiotic relationship where community colleges host students and then send to a lab for a short practicum. Other variations include the labs helping to shape the curriculum and courses offered according to local labor needs. In addition, in some cases degrees are linked to lab hiring. (Examples include LLNL, LANL, INL, BNL.)
 - **Competitive salaries** – It is important to ensure HR knows the skill set of those being hired, since they may have more skills than expected. (LLNL’s technician program prioritizes upskilling.)
 - **Awareness of schools that specialize in certain skill sets** – Programs know the different schools around the country that teach different skill sets. (An example is LLNL, which recruits specific backgrounds from states with certain specialties.)
- **Standout programs at specific DOE labs**
 - **Los Alamos Radiological Control Technician Program** – Program developed over 29 years by LANL staff member Michael Duran. It is coordinated with a local community college to establish both degrees and curriculum. State government funding supports the program, and it provides a diverse candidate pool to LANL. 30% of RCTs have gone through program, and program graduates tend to stay at LANL for their whole career.
 - **Lawrence Livermore Integrated Technologist Program** – This program organizes all technician and technologist programs at LLNL. Program Lead Randy Pico has been at

several DOE labs over 40 years. The program recruits lots of former military, has extensive relationships with native American tech colleges, and works directly with community colleges through their advisory board to mold curriculum needed for the lab.

- **Opportunity Finder** – A PNNL tool for technicians that trains staff internally for upskilling to another job.

Recruiting

- **Programs in place at multiple DOE labs**
 - **Military veteran programs** – The Hiring Our Heroes program emphasizes military and veteran recruiting, including dual-career challenges. Identification of special existing skills and upskilling, and streamlined route to security clearance, are features of this program. (LANL and INL are examples of participants.)
 - **Dual-career programs** – Programs to place dual partners at the labs exist across the complex. (Examples are INL, LANL, Ames). The HERC (Hire Education Recruitment Consortium) program is a national search for dual careers. (Ames, ANL, BNL, and LBNL participate.)
 - **Social media presence** – Many labs are improving their social media presence, which assists in advertising professional and exciting social media pages to younger generations. (An example is LLNL’s streamlined LinkedIn searches to identify lab jobs by keywords from the job posting.)
 - **Interview training** – Programs to teach best practices to interviewers include providing training in behavior interviewing, learning how to make someone comfortable in an interview, and more. (An example is LLNL’s recent efforts.)
- **Standout programs at specific DOE labs**
 - **Talent Neutron software** – LLNL uses this software to allow candidates to take a job posting and find companies or organizations that hire people with particular backgrounds.

Hiring

- **Programs in place at multiple DOE labs**
 - **HR Partnerships** – Deployed HR representatives in each organization can help streamline the paperwork in the hiring process. (An example is LANL.)
- **Standout programs at specific DOE labs**
 - **Hiring Point of Contact** – This ORNL program has found success with having a hiring point of contact (a scientist) in each directorate. They have found that scientists like to talk to other scientists, rather than talking to HR, about hiring needs.

- **Smart Recruiters software** – This LLNL hiring software is intuitive and enhances the applicant and hiring manager experience.

Programs Promoting a Diverse Workforce

- **Programs in place at multiple DOE labs**
 - **SULI Program** – (Science Undergraduate Laboratory Internship program) is a national DOE program for minority undergraduates wanting to spend a summer at a national lab. This provides a subsidized way for projects to bring in and engage undergraduates. (All 17 DOE labs participate.)
 - **National GEM Consortium** – At least 12 national labs are members of the GEM Consortium, which allows them to bring in GEM Fellows, highly selective graduate students from specific minority backgrounds, for internships that are sometimes repeated for multiple summers. (ANL, BNL, Fermilab, INL, LBNL, LLNL, LANL, NREL, ORNL, PNNL, PPPL, and SNL participate.)
 - **Minority Serving Institution Partnership Program** – This program creates a direct pipeline between the DOE labs and minority-serving institutions in STEM disciplines. (ANL, BNL, LLNL, LANL, NETL, ORNL, PNNL, SNL, and Savannah River participate.)
 - **Recruitment of diverse populations and females** – The labs are strategically enhanced by strong relationships established with organizations serving these populations. (Examples include BNL’s participation in Girls, Inc. of Long Island, Girl Scouts, the NSF funded Louis Stokes Alliances for Minority Participations, the New York State Science and Technology Entry Program (STEP) and the NYS Collegiate STEP program (CSTEP), the Society of Women Engineers, and the National Society of Black Physicists conference.)
 - **Day cares options for lab employees or lab guests** – Several labs have day care centers either on or near campus for employees. Notably, Fermi lab even provides day care services to visitors. (Examples include Fermi lab, ANL, and LLNL.)
 - **Summer programs for underrepresented minorities** – Many programs exist.
- **Standout programs at specific DOE labs**
 - **InCREASE** – A BNL consortium of faculty from minority serving institutions and underrepresented minority faculty that conducts research in collaboration with DOE researchers at DOE facilities.
 - **STEM Prep** – This is a 4-week BNL program for underrepresented minority students.
 - **My Amazing Future** – An INL program that brings all fourth grade female students in the region to a whole-day event at the lab.
 - **Young Women Conference** – A PPPL program to bring high school female students in the region to a whole day event at the lab.
 - **Science Careers in Search of Women Conference** – An ANL program to introduce young women to Argonne’s mission space.

Tactical Recommendations – short-term enhancements to pipeline and recruitment strategies

The outcome of this think piece is a series of short- and long-term recommendations to enhance pipeline and recruitment program availability at the DOE labs. We begin here with the more tactical short-term recommendations based on what we learned in our research.

1. *Connecting programs within a lab tends to improve outcomes.*

At some labs, strong connections exist BETWEEN programs, and this is facilitated by maintaining an umbrella organization that houses all pipeline and recruitment programs. This allows a consistent and streamlined approach to the problem and avoids duplication of efforts. It also facilitates tracking of the students' scientific journeys throughout the entire K-12/College/University pipeline.

2. *DOE-wide umbrella organizations help push all labs to do better through sharing of innovative approaches.*

We encountered some instances of programs crossing lab boundaries to incorporate ideas from multiple labs. For instance, the National Lab Postdoc Forum is a resource for those working in postdoc program offices at 12 DOE labs. There are also a few examples of HR or other key personnel moving between labs and taking their experience and knowledge of workforce programs and standing them up at their new lab. We also learned that sometimes an employee uses an example of another lab doing something as organizational motivation to get it done at their lab. Our recommendation for these cases is clear: across the DOE complex, we should work hard to SHARE innovative approaches.

3. *Success at workforce development reflects investment by the laboratory.*

In many cases that we came across, assembling a critical mass of team members led to innovative solutions. For example, Educational Program offices staffed with more than a dozen employees contributed to the free energy to deploy more unique programs. Another example is investing in a labor economist, which can result in dividends for the organization in terms of analytics and implementation of workforce programs. For these approaches to work, funding and resources at the institutional level must be adequate to the task. Individual labs must prioritize needs for their specific circumstances in order to decide where they should invest.

4. *Diversity is a critical component of workforce health.*

The lack of diversity in scientist and engineering staff seems to be deep-seated and structural – here labs have had success with programs such as GEM that nurture a diverse workforce starting in college. In addition, some labs have reported success in diversifying their workforce through the technician program by partnering with specific underserved communities.

Strategic Recommendations – A proposal for a DOE Academy

While current lab-by-lab and DOE HQ efforts are successful, there are many overlaps and duplications in efforts across the lab system, which could benefit from a lab-wide lens and effort. We propose a bold, holistic DOE HQ-driven initiative with a joint focus on pipeline, recruiting, and workforce development – DOE Academy² - in order to a) drive national and lab-level programming with national data, b) bring scale to bear when providing common tools, programming, national-level partnerships, and resources for the labs, which can be supplemented at the local level, and c) fills gaps across discrete efforts and programming – which will result in higher impact pipeline and workforce returns for the DOE system and the country.

The “highlights” section above, representing the current successes at the national labs, form the backbone of the DOE Academy proposal, which simply scales the efforts to national level.

DOE Academy activities could involve the following:

- **Future Skills Map**
 - ☒ Based on DOE priorities and national data, do a study to provide data on priority research areas and researcher (quantity and skill level) needs, 5-years and 10-years out, with a focus on critical capabilities (e.g. power systems, cybersecurity), and new and emerging areas (e.g. AI/ML, quantum).
- **Single System Branding and Systems for Recruiting, Growth, and Retention**
 - ☒ Provide single-system national lab branding to enhance public name recognition, which will enhance recruiting.
 - ☒ Support a DOE-wide job portal to highlight openings across the system in one location.
 - ☒ Enable job mobility across the lab system and DOE, to allow for maximized job growth and development while staying in the “DOE pipeline”.
- **National-level partnerships**
 - ☒ Form strategic umbrella organizational partnerships (e.g. big industry, IBEW, MSRDC, UEI) related to workforce to better enable lab-specific partnerships and activities.
- **Program Optimization and Gap-Filling**
 - ☒ Co-locate and optimize the portfolio of DOE workforce programming (internships, apprenticeships, fellowships, postdocs, visiting faculty programs, etc) to meet needs of the Skills Map and complement the pipelines. This includes creating strategy around collaborative gov/academic/industry opportunities including hands-on/experiential learning at the labs/industry, taking lab/industry expertise into the classroom (including specially-created curricula), managing

² Bakhtian, N.M., “DOE Academy,” White paper. September, 2020.

re/upskilling of current workforce via training/badging/certificates/degrees, managing communication of opportunities and matchmaking, and optimizing recruiting. Integrate diversity goals and strategy from the beginning.

- **Common Tools**

- ☒ Manage common elements of external recruiting to avoid duplication across 17 labs, especially as connected to critical elements of Skills Map.
- ☒ Create common tools such as for tracking/engaging with lab alumni (e.g. interns) for future recruiting purposes, professional development opportunities for internship/fellowship/postdoc programs, social media tools, etc.
- ☒ Help create framework for virtual workforce pool (silver lining of COVID) for full-time or programming such as internships/etc to help grow DOE's talent pool.

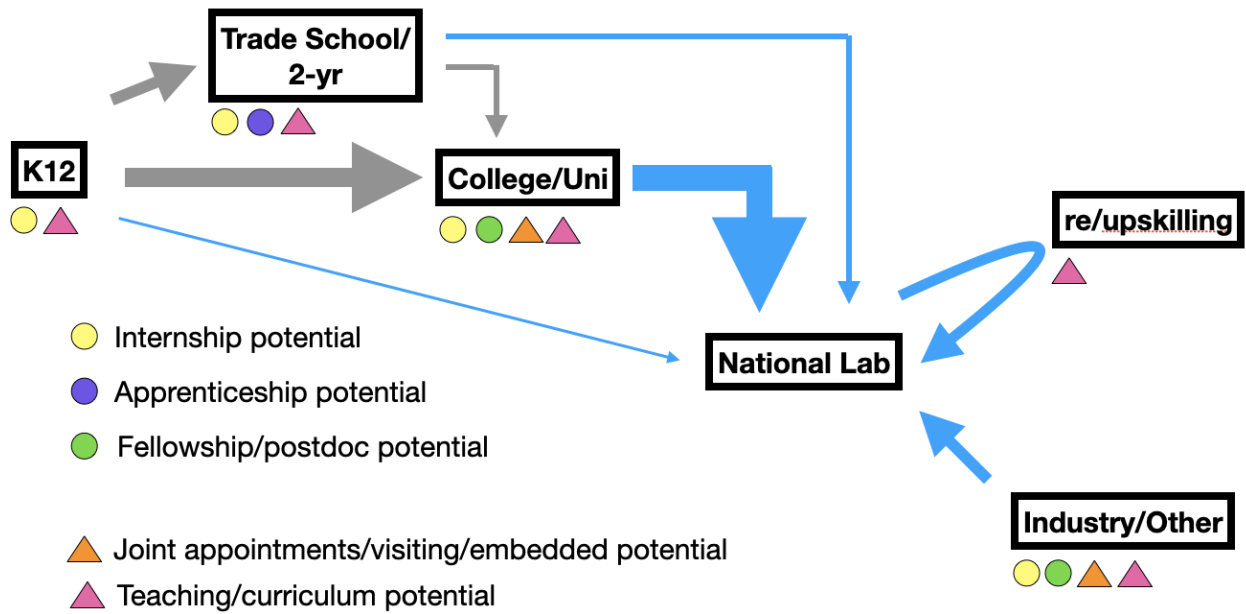
Although beyond the scope of this work, we recognize that the labs and DOE engage in workforce and STEM activities in order to impact the national energy workforce beyond DOE. DOE Academy's activities would naturally cover national energy workforce strategy as well, including

- Future Skills Map
- Illuminating, Creating, and Optimizing Pipelines³
- Strategic Programming and Formalized Partnerships

Co-locating these activities and the DOE Academy lab-specific activities would provide co-benefit.

Given growth in world energy consumption, a shrinking U.S. workforce, and dependence of our national energy systems on development of a robust, highly qualified, and educated workforce, the time is now to implement a DOE-wide strategy to build and maintain a DOE workforce in energy through collaborative development, recruitment, and retention of world-class talent.

-
- ³ Working across a) the lab system, b) all levels of academia (e.g. a national consortium across university energy institutes already exists), and c) industry, DOE Academy would illuminate existing pipelines - both internal (upskilling) and external - and implement successful programming. Using the Skills Map, DOE Academy could identify critical gaps and create pipelines and offramps between and from k-12, technical/community colleges, 4-yr institutions, graduate programs, MSIs, veterans programs, and DOE system/industry. This centers on communication of workforce needs to academic institutions, mitigating pipeline "shocks" by streamlining administrative hurdles (e.g. degree transfers, state tuition rules, providing mentoring), and enhancing energy literacy across educational levels. DOE Academy would integrate diversity goals and strategy from the beginning.



Appendix A – Survey questions given to OSELP Cohort 4 members to solicit input on innovative programs

Highlights

Please list one or two areas where you think your lab is succeeding with particularly innovative programs or ideas in the areas of pipeline development and recruitment strategies.

Lab Recruitment Strategy Questions (Recruiting, Hiring)

1. Does your Lab have a recruitment office or strategy for hiring staff at multiple levels? Please describe your Lab's approach.
2. What is the typical hiring path for laboratory staff? Please describe your hiring process, including any standardizations such as job ads and interview processes.

Lab Pipeline Strategy Questions (K-12, College, University, Apprenticeships, and Postdocs)

3. What K-12 programs does your lab conduct or participate in to familiarize young local students with the work that your Lab does, prepare for future hiring, and promote STEM education?
4. Does your lab have a partnership with local universities and colleges to attract talents in STEM? Please describe what this program looks like.
5. Does your lab have an internship program for students and how is it folded into the strategic plans for developing the lab workforce?
6. Does your Lab work directly with any societies or universities that promote a diverse and inclusive work force (i.e. the Grace Hopper Society, the Society of Women in the Physical Sciences, Society of Women Engineers, historically black colleges and universities)?
7. Please describe your Postdoctoral Program. What fraction of your staff comes from the postdoc pipeline?
8. Does your Lab emphasize named Fellowships or other programs to recruit highly talented researchers in competitive fields?
9. Does your Lab have any internship or apprenticeship programs to train technicians? Please provide a short summary of the program and how it contributes to your workforce goals.
10. Does your Lab have a targeted strategy that touches on specific future workforce needs (e.g. have you done an analysis to determine what areas need to be filled in the next 5-10 years)?

Appendix B – DOE lab contacts we interviewed

Following up on the survey recommendations made by cohort members (see Appendix A), we interviewed a number of lab contacts to discuss pipeline and recruitment strategies and learn more about unique programs. We would like to thank the following people for generously spending time with us (virtually)!

- Hope Morrow, INL, labor economist
- Trevor Budge, INL, senior recruiter
- Jackie Gonzalez, LLNL, recruiter
- Bre Sweet-Kerschbaum, ORNL, talent acquisition
- Mary Anne With, LANL, postdoc program lead
- Christine Zachow, LLNL, postdoc program
- Michael Duran, LANL, technician program lead
- Randy Pico, LLNL, head superintendent of technicians
- Noël Bakhtian, INL (now LBNL), CAES Director
- Tony Baylis, LLNL, D&I lead

In the course of our many virtual lab visits this year, we also met with many program leads and contacts who contributed to our understanding of pipeline and recruitment strategies at the labs. We thank them for their time and insight!

- INL: Toni Carter, Theron McGriff, Donna O’Kelly, Ray Enge
- BNL: Noel Blackburn
- LBNL: Lady Idos
- ORNL: Jeremy Busby, Kate Evans, John Galambos, Julie Mitchell, Xin Sun, Moody Altamimi, Gary Worrell, Marilyn Foxall, Mardell Sours, Deborah Bowling
- PNNL: Tanya Bowers, April Castaneda
- ANL: Julie Nuter, Megan Clifford, Kirsten Laurin-Kovitz
- PPPL: Arturo Dominguez, Shannon Greco, Jordan Vannoy
- Ames: Chelsey Aisenbrey, Erin Gibson, Jamie Morris, Meredith Ohrt, Andrea Spiker
- NREL: Carin Casso Reinhardt, Danelle Wilder
- SNL: Sarah Rob Nelson
- SRNL: Sarah Vivian Holloway
- SLAC: Sarah Holder, Natalie Holder
- LANL: Carol Burns, Dave Clark, CJ Bacino, Nan Sauer, Alan Hurd, Duncan McBranch
- JLab: Steven Uwajeh
- Fermilab: Sandra Charles

OSELP

Oppenheimer Science and Energy
Leadership Program (OSELP)

Cohort 4 Think-Piece Summary

***Moonshots: Harnessing the Potential of the National
Laboratory Complex to Address Critical National Priorities***

Moonshots: Harnessing the Potential of the National Laboratory Complex to Address Critical National Priorities

Noël Bakhtian (INL/LBNL)
David Miller (NETL)
Erin Searcy (INL)
Jennifer Kurtz (NREL)
Despina Milathianaki (SLAC)

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Presentation to NLDC 6/10/21	Pages 3-9
Accompanying Script 6/10/21	Page 10-13

For access to additional notes and information related to this effort (incl. literature review, etc),
contact noel@lbl.gov

Moonshots: Harnessing the Potential of the National Laboratory Complex to Address Critical National Priorities

Noël Bakhtian (LBNL), David Miller (NETL), Erin Searcy (INL), Jennifer Kurtz (NREL)
June 10, 2021

The national laboratory system was created in response to a national- and global-scale threat to our safety, security, and prosperity. Eighty years later, the national lab system has grown and expanded. Is there potential to even more fully harness the power of the evolved national lab system for maximum impact aligned with the future grand challenges or “moonshots” of today and tomorrow? This Oppenheimer Science and Engineering Leadership Program (OSELP) Cohort 4 Think Piece offers recommendations to create a national lab super-structure and framework to enable successful national lab system-led Moonshots, and provides next steps for executing on a climate change Moonshot to fully engage the national lab system for the Biden-Harris Administration’s climate goals.



Noël Bakhtian



David Miller



Erin Searcy



Jennifer Kurtz

Moonshots: Harnessing the Potential of the National Laboratory Complex to Address Critical National Priorities

Noël Bakhtian, LBNL

David Miller, NETL

Erin Searcy, INL

Jennifer Kurtz, NREL

Adapting DOE lab system for future challenges

- Up to now
 - Born out of the Manhattan Project
 - Labs have come together to solve critical, timely challenges
- Today and our future
 - How can DOE and the National Lab system more effectively address current and future grand challenges?

17 National
Labs

\$30B Annual
Public
Investment

60K FTEs

Our Approach

- Broad perspectives: What has worked? What hasn't?
 - Leveraged OSELP mentors and contacts
 - Engaged the OSELP Cohort
 - Literature review
- Summarized key take-aways from deep-dives
- Developed characteristics & path forward
- NLCRO Feedback

Engagement & Feedback:

Adam Cohen

Arati Prabhakar

Bill Madia

Charles McMillan

Dan Arvizu

Henry Chesbrough

Horst Simon

Jill Hruby

Lynn Orr

Marianne Walck

Michelle Buchanan

Mike Knotek

Norm Augustine

Pat Dehmer

Paul Alivisatos

Peter Green

Sig Hecker

Steve Hammond

Teeb Al-Samarrai

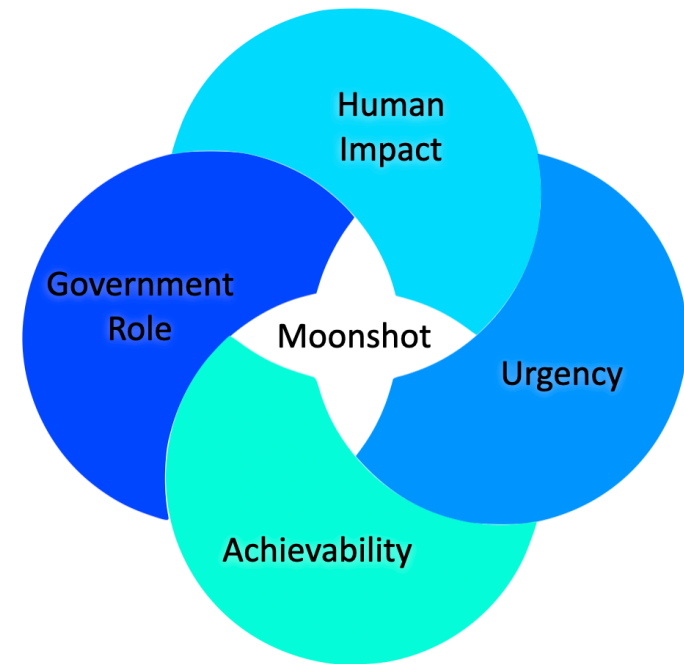
Tom Kalil

Our Concept: Moonshots

A **Moonshot** is an ambitious but well-defined goal requiring a multi-institution, multi-disciplinary effort to accelerate a solution to overcome an existential threat to U.S. security and well-being.

Create a National Lab super-structure and framework, applicable to specific Moonshots, which will:

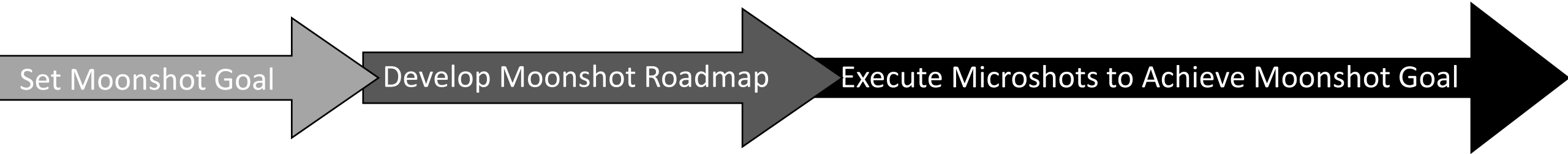
- Accelerate outcomes via tight **collaboration** of up to 17 Labs, beyond “sum of the parts” coordination (distinct from hubs, institutes, centers)
- Leverage core lab expertise/capabilities with **intentional integration** & knowledge transfer with industry, academia, regulators, & communities
- Develop a **roadmap** to achieve the Moonshot goal in a given timeframe
- Execute the roadmap “**Microshots**” ranging from science to technology to deployment
- Be funded and **championed by DOE**, with clear role within Administration’s masterplan



Critical Characteristics for Successful Moonshot

1. **Well-defined problem and a goal** that is ambitious, measurable, and achievable
2. **Clear communication** of challenge, vision, and goal for public understanding
3. Defining the **appropriate role for the Labs** based on capabilities, equipment, and expertise & **intentional engagement** with partners across TRL
4. **Broad buy-in** from S&T community (bottoms-up) & Administration (top-down)
 - bipartisan support
 - DOE champion with influence
 - buy-in across the Department and Labs, and beyond government
5. **Integrated roadmap** - from here and now to the Moonshot goal - to include manageable chunks (aka Microshots)
6. Ability to **“fail successfully”** and pivot agilely
7. **Competition** enhances innovation - enable multiple paths to success
8. **Clear leadership structure** and coordination
 - full-time, effective leader sub-DOE level
 - clear roles/responsibilities/accountabilities/authorities
 - clear DOE decision path and DOE-internal coordination
9. Substantial and **sustained funding** with balanced oversight
10. A **sense of urgency and collaboration beyond “business as usual”** – tied to Moonshot goal – is essential

Climate Change: Moonshot for the 21st Century

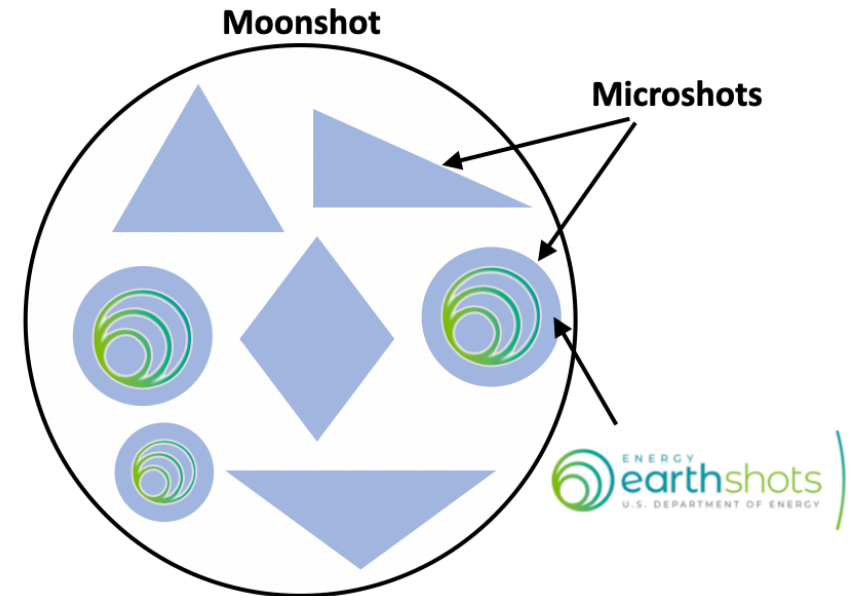


EXAMPLE

Moonshot Goal: Decarbonized electric grid by 2035 / Decarbonized economy by 2050

Roadmap: The plan to get from here-to-goal
i.e., energy transition by 2035/2050

Microshots: Strategic smaller goals that lead to
successful Moonshot



Recommendation

Establish a Task Force to develop a proposal to DOE on an optimal national lab system organization and strategy to address a climate change goal via Moonshot framework

- **NLDC Establishes Moonshot Task Force**
 - Clear leadership, resources, R2A2s
 - Diverse representation from interested Labs and invited key external stakeholders
- **Task Force formulates generic Moonshot framework (Months 1-6)**
 - Utilizes insights from OSELP Moonshots Team & incorporate Critical Characteristics
 - Define Moonshot structure/governance for “beyond BAU” (National Labs/DOE)
 - Identify integration/handoffs with industry to scale and deploy to market (deployment)
 - Identify ways to better manage cross office interests (DOE)
- **Task Force formulates climate Moonshot pitch (Months 1-6)**
 - Develop initial draft climate roadmap & Microshots (plan)
 - Identify opportunities for Congressional support (funding)
- **NLDC review & refinement**
- **NLDC pitch to DOE (S1)**
- **Labs refine plan & execute climate change Moonshot**



Title Slide

- To start, I've got a question - how many of you remember where you were on July 20, 1969, the day Neil Armstrong walked on the Moon?
- But that One Giant Leap for Mankind was kindled almost 7 years earlier - does anyone remember what occurred in 1962 on September 12?
- That's the day President Kennedy gave his nation-rousing "We choose to go to the moon" speech.
- Before I dive in, I want to start by saying we're excited to be here and we thank you for the opportunity to take part in the Oppenheimer Cohort and also to share this with you today.
- I'm Noel Bakhtian - when we started in OSELP, I was at INL (Idaho National Laboratory) and now I'm at LBNL (Lawrence Berkeley National Laboratory). I'm representing the Moonshots team today, comprised of Dave Miller at NETL (National Energy Technology Laboratory), Erin Searcy at INL, and Jen Kurtz at NREL (National Renewable Energy Laboratory). We also want to acknowledge our teammate Despina Milathianaki formerly of SLAC (SLAC National Accelerator Laboratory).
- Our team figured out early on - that like many others - we are part of the national lab system because we see the potential of this complex to address the most important national and global challenges.

Adapting DOE's lab system for future challenges

- This Oppenheimer program - with deep dives at all 17 labs - has really driven home our heritage and how we were born out of the Manhattan Project - a Moonshot in itself. Since then we've grown into a 30 billion dollar, 17-lab system that is often called the crown jewel of the US research and innovation enterprise, founded on invaluable infrastructure, capabilities, and expertise.
- The question we posed was: is there potential to even more fully harness the power of the national lab system for maximum impact, especially to directly address the scariest challenges or the most complex opportunities our nation and world are facing, head on.
- And our answer is yes - let's work together, at a scale beyond our business as usual, to execute on Moonshots as a national lab system.

Our Approach

- Our approach was to start by listening and learning - through a literature review and extensive interviews with senior leaders across the complex and beyond, some of whom we talked to multiple times. What we came back with was widespread enthusiasm for the Moonshots concept and a starting playbook for critical characteristics for success, which I'll share in a few slides.
- From that, we drafted our recommendation to you and also got in front of the NLCRO (National Lab Chief Research Officers) for further refinement.

Our Concept: Moonshots

- So, let's dive into the Moonshot concept.

- We defined a moonshot as an ambitious but well-defined goal, requiring a multi-institution, multi-disciplinary effort to accelerate a solution to overcome an existential threat to U.S. security and wellbeing.
- The focus here was twofold -
 - First, what could we do differently as a national lab system to be better positioned to tackle these. And we're talking at scale - think closer to Manhattan Project than EFRCs or the innovation hubs or the big ideas summits.
 - And second - what moonshot should be the first we go after together.
- This slide and the next address the first question of how to go after moonshots together:
- Our idea is to create a virtual national lab and DOE (Department of Energy) superstructure and framework capable of successfully executing on moonshots. Which means it would need to be able to accelerate outcomes via collaboration - but concentrating, again, on going beyond sum of the parts.
- Recognizing that moonshots will often go from early TRL (technology readiness level) all the way to deployment, this structure will also require intentional integration beyond our national lab bubble - partnering with industry, academia, all levels of gov, regulators, the finance sector, and communities.
- Moreover, we need to ensure that we're fully considering the role in the RDD&D (research, development, demonstration, and deployment) ecosystem where it makes sense for the national labs to play in whichever moonshot we're considering given our current and potential expertise and capabilities - and then be deliberate about partnerships and external collaborations. The superstructure and governance that helps bridge all 17 or a subset of the labs and external partners is extremely important - and what we posit is that this effort - which we've already put some thought into - would build on lessons learned from previous efforts - NVBL (National Virtual Biotechnology Laboratory), EFRCs (Energy Frontier Research Centers), energy innovation hubs, big ideas summit and crosscuts, grand challenge - but be different in its scale and collaboration model.
- So. With that superstructure in place, the idea would be to identify the goal for a specific moonshot, develop a roadmap, and execute on microshots to get there. When I coined the term microshots, I was thinking about how the original moonshot started with the Mercury program with sub-orbital and orbital flights around Earth, advanced to the Gemini missions, and ended in Apollo and a successful Moonshot.
- And of course this would require full buy-in from DOE and, given the scale of the moonshots we're considering, likely need to find a place in the Administration's plans - whether it stems from there, or lands there as a result of lab leadership.

Critical Characteristics for Successful Moonshot

- From our research and interviews, we developed a list of 10 characteristics critical for success in a Moonshot endeavor. We've already mentioned several, but I'll call out a few more here -

- #6 - Ability to fail successfully - and by that we're referring to the importance of taking risks, but also the ability to pivot agilely.
- #4 - Broad buy in is necessary for the scale we're talking about - both bottoms up from the S&T community and industry but also top down from the Administration and Congress - that leads to...
- #9 Substantial and sustained funding with balanced oversight.
- #8 Governance is a key to success - clear structure and coordination between the players, full-time effective leader empowered to make decisions, and a streamlined DOE decision path AND coordination between DOE offices at the budget level - are critical.
- And #10 can't be overstated: a sense of urgency and collaboration - not coordination - beyond business as usual.
- Now to the second question of what moonshot to go after first - what we quickly realized was that the four of us had something else in common - something that drives us every day - climate change.

Climate Change: Moonshot for the 21st Century

- Climate change is an existential threat, and even before the new Administration came in, there was of course a lot of national lab work in this space already, for decades. However, thinking through the Moonshot framework, we firmly believe there's opportunity for scale and integration for greater impact.
- So on this slide, using a climate-related moonshot simply as an example, we're double clicking on what we mean by a moonshot goal, roadmap and microshots and giving an idea of how this might go for a moonshot associated with climate change.
- The first step would be to set the moonshot goal - this would be done in combination with DOE and other stakeholders. The Administration has already announced their 2035 and 2050 decarbonization goals which are examples of what the moonshot goal could be, or the goal could be different.
- Then the labs would develop the roadmap, again with a broader community - the national plan to achieve the goal.
- And this would include a series of microshots - smaller but strategic goals that allow us to reach the moonshot goal.
- And by the way, the Earthshots that were publicly announced by DOE this month fit within that mold, and could well be examples of some of our future climate microshots.

Recommendation

- So those are the 2 ideas - a national lab superstructure and framework capable of better leveraging the lab system to execute moonshots - whether DOE is leading or supporting, ...and...launching the first one - a moonshot related to climate.
- So here's our recommendation to the NLDC (National Lab Directors' Council):
 - Establish a Task Force to develop the proposal over the next 6 months that would go to DOE around a climate change moonshot and the underlying national lab framework for this and future moonshots - leveraging the 250 pages or so of notes and ideas this team has put together over the last 18 months.

- To double click on this recommendation:
 - We propose a diverse, forward-leaning task force which would include representation from interested labs but - we also want to act on one of the characteristics we mentioned - and include critical key external stakeholders from the beginning - industry for instance.
 - The task force would work on 2 parts - the generic moonshot framework, so more fully developing answers to questions like:
 - What's the multilab structure and governance that gets us beyond BAU (business as usual) collaboration?
 - What's the intentional integration with academia, industry, regulators, and communities to ensure science to systems to market?
 - What would we need from DOE and Congress to be successful - everything from budget to alignment between offices, etc?
 - And then the Task Force would also develop the initial draft climate goal, roadmap, and microshots - simply as an example to the Administration - fully recognizing that if this is successful, the full plan would be a joint effort with DOE and external stakeholders in concert.
 - Then, with NLDC blessing, pitch to Secretary Granholm together, as a lab system.
- To close, I'll just say it's been quite a journey since the day this idea launched, back in January 2020, in a conference room during our first Oppenheimer visit in New Mexico.
- Since then, a lot has changed - the NLCRO and NLDC have put out the horizon scanning report, we got a new Administration 10 months in that has made it clear that climate is a priority across the federal government and in fact John Kerry came right out and called climate change our generation's moonshot, and like I mentioned, just this month the Administration announced the first of their Earthshots.
- It feels like the right time - DOE and the other agencies are primed and ready to execute.
- And the people in this room know better than anyone, the power that the labs can bring to this challenge.
- It's up to us to show the world what we can do together, and that we can lead the charge, and then execute.
- We need to stand up together and say - we choose to do this not because it's easy, but because it's hard.
- If we're the crown jewels, then how can we not. Because if not the national labs, then who.
- And with that, thank you again for your consideration, we look forward to your feedback, and we're standing by to support you on next steps to make this a reality.

Note: parentheses describe acronyms used in script

Note: underline implies verbal emphasis

OSELP

Oppenheimer Science and Energy
Leadership Program (OSELP)

Cohort 4 Think-Piece Summary

***Building the Future of the Labs from the Lessons Learned
During Covid-19***

BUILDING THE FUTURE OF THE LABS FROM THE LESSONS LEARNED DURING COVID-19

Sarah Allendorf, Julienne Krennrich (co-lead), Joe Manna, Peter Nugent, Francesca Poli, Wendy Shaw (co-lead), Leslie Sherrill

Overview

We propose two recommendations based on our experience with COVID-19 over the past year.

1) We embrace the transition many of our labs are taking to a hybrid working model, where some people are fully on site, some are fully virtual, and some are a combination. However, we propose the intentional implementation of policies and tools to enable the latter two scenarios to be successful, including “in the background” software to enable serendipitous interactions to help build culture and innovation in this modified mode.

2) We propose that our ability to effectively work remotely enables inter-lab exchanges, with 1-5 people per lab each year relocating to a new lab, from 3 months to a year (or longer), with ½ of their work being performed remotely for their home lab to avoid leaving a hole and facilitating reintegration.

Approach

We approached this thinkpiece with the idea that with boots on the ground at every lab, we would have a unique view into the effects of the pandemic. We collected a variety of operational data as we worked to formulate the focus of the thinkpiece, with the idea that we could comment on lab response to the events of 2020-2021. As the pandemic progressed, we observed a lot of positive actions across the lab. We saw that: 1) the labs were very agile and flexible in implementing solutions to enforced remote work; 2) the safety protocols worked, where the majority of the labs were safer than the surrounding areas and almost all of the labs had fewer than 2 cases transmitted on site; 3) remote work was largely effective. From what we could observe, there were no clear operational pitfalls.

While we were collecting our lab data, we also researched a variety of literature to learn best practices and challenges related to dealing with the pandemic, remote work in general, and remote work during a major crisis. We also met with many senior leaders¹ in addition to learning about many of the labs’ pandemic response during our virtual site visits. This research, along with our own perspectives, led us to four areas that we felt could be impacted by our experience during the pandemic:

¹ Julie Carruthers (DOE)

Susannah Howieson (DOE)

Ron Townsend (Battelle)

Charlie McMillan (LANL)

John Sarrao (LANL CRO, NLCRO lead)

Pat Dehmer (DOE, retired)

Jack Anderson (COO BNL, Co-Chair LOB HR/Benefits Working Group, NLCOO)

- 1) Changes that might need to be implemented as we go from a virtual or hybrid work environment, as the result of the pandemic, to the same environment made as an institutional choice,
- 2) Using what we have learned from effective remote work to enable short term inter-lab transfer to build a stronger national lab community,
- 3) Some groups were more affected by the pandemic than others, particularly women,
- 4) The idea of having a group of scientists across the lab ready to respond during a crisis.

In our discussions, we learned that the COO's and the CRO's were developing a white paper to address some of the Human Resource issues affecting women and other groups—we were invited to be part of this group and contributed in that way. We also learned that Susannah Howieson was developing the idea of a Scientist Reserve Corps—many of our OSELP cohort, and previous OSELP members were part of those discussions, and our thinkpiece team continues to be engaged to share what we learned. Based on these significant efforts by others, we decided to focus on (1) and (2) as impactful ways that we can alter the trajectory of the National Labs from what we have learned over the past year.

Recommendation 1

Proposed Action(s) and Justification

- From our literature review and ongoing publications and articles on the subject, it has become clear that a large majority of workers surveyed by a variety of organizations desire a hybrid work structure.² This also resonates with the information we collected from the Labs by our conversations with Lab COOs and Covid response teams. Research, as well as anecdotal experience, shows offering hybrid work has become a recruiting issue, even amongst the science and engineering workforce. Many executives are reporting concerns with maintaining culture, and ensuring equity in productivity, pay and promotions between onsite and remote workers in a hybrid environment. Therefore, there is a need to introduce some rules and new norms to intentionally guard against these pitfalls, as we adjust to the new normal and the lab of the future.
- Action: Identify and implement policies and practices that *intentionally* describe the ground rules for long term successful implementation and cultural assimilation of employees.
 - Meetings shall continue to have VC options and include video; some software allows one to track who is speaking, so that leaders and managers can purposely draw out those that are more reserved and less likely to contribute during large group settings.
 - Leaders need to model new norms of intentionally pausing meetings when IT fails, to ensure remote workers are included. Alternative is to continue completely remote meetings for all hybrid teams to maintain inclusivity.
 - Onboarding culture should involve intentional meetings with leadership and frequent meetings with first line supervisor, and ideally some time on site to get acclimated to the lab operations and capabilities by working with colleagues to understand the intricacies of lab safety expectations and develop a scientific foundation for the programs through technical mentorship by senior staff..
- Supporting IT Actions:
 - Implement the broad use of “in the background” software tools that enable **rich** virtual engagement, including enabling meaningful “accidental” interactions. Examples include Virbela, Gather.Town, Spatial.Chat, Remo, and Shindig.

² See, for example, the research reported here: Cutter, Chip, “Companies Brace for Reality of Hybrid Work,” *Wall Street Journal* print ed., May 26, 2021.

- Allow labs flexibility in identifying the best platforms; a bonus would be a common platform among the labs in order to improve cross-labs communication and collaboration.

Benefits

- Proactively address barriers to full engagement in the coming hybrid workplace
- Ensure everyone feels they are mission essential
- Tools offer a more “real” virtual feel and allow for unscheduled interactions, just like onsite.
- Levels the playing field between onsite and off-site workers, to ensure opportunities and promotion are equitable.
- Ensures that offsite workers aren’t left out, feeling disconnected with the site mission objectives and/or left with a feeling their contributions are not of similar value to the lab.

Potential Unintended Outcomes to be considered

- Not everyone adjusts quickly to virtual environments. Some individuals have proven their ability to work effectively virtually, whereas for others it was more of a challenge. Additional training may be required to ensure this model can be sustained long term. Some individuals may need 1-1 follow-up by managers to elucidate input. Managers may need training on how to be more intentionally inclusive in group meeting/brainstorming settings.
- There will be a learning curve that may initially reduce productivity for some.

Barriers

- May require adjusted meeting norms, including pausing meetings when VC IT fails until remote participants can rejoin.
- Labs may not have the flexibility required to implement the best tools.
- May require some IT expenditures upfront.
- May be unanticipated cybersecurity concerns.
- Those without access to high bandwidth or behind the firewall may be limited in how they can use these tools.

Implementation Approach

- Pilot use of platform within a division at a Lab. Require daily/automatic login to encourage use and to maximize the potential high-quality, “accidental” interactions between those on and off-site.
- Introduce people to the tools by hosting virtual poster sessions, brainstorming sessions, and coffee hours, for example.

Recommendation 2:

Proposed Action(s) and Justification

- Action: Take the best of work-from-home opportunity and expand across the Labs by establishing a cross-lab scientific exchange program.
- We propose a leadership rotation in a cohort style: Each lab would send 1-5 people to another lab for 3 months to a year (or even longer). The visitors live in the location of the guest lab, spending ½ of their time learning the lab, operations processes, mission, and culture. They stay **remotely** connected to their “home” lab and projects 1/2 time, while on assignment in the rotation.

- Program would allow for reverse exchanges (e.g., “trades”), regional exchanges, short or long (e.g., summers, 6 months, 1 year). The visitors work collaboratively to establish new programs and directions of research or launch recently funded major projects.
- The exchange person could work on programs that already involve a collaborative program ongoing between parent and host lab or could work towards the development of new program collaborations involving the two labs.
- Target demographic: late-early-career to mid-career.

Benefits

- Set the foundation for a new model for DOE to manage the National Labs for tackling large problems collectively,
- Individual participants increase their own knowledge of other labs, gain new perspectives, expand networks,
- Lab Complex benefits overall as the learning is brought back and shared with others at the home institutions,
- Keeping the person actively connected with their home institution avoids creating a hole while they are gone and enables a smooth transition when coming back from their assignment.

Potential Unintended Outcomes to be considered

- Don’t want to create a “two full-time jobs” situation. It would be incumbent on the home institution to reduce the participants’ workload to no more than ~1/2 time, which would have to be able to be done remotely. Benefits and salary should not be reduced.
- Does the program require central coordination? If yes, who is responsible? Should there be other cohort-level training/development made available to cohort?
- Who needs to approve rotation at the individual Labs? Does this require HQ approval?

Barriers

- How funded? LDRD, Program \$\$, Indirect costs. Allowability of costs?
- Would federal employees at NETL be able to participate?
- Family re-location would need to be addressed so as not to inhibit fair participation from a range of people.
- Costs of living and taxes would also need to be addressed.
- Ensuring no gaps in benefits, insurance—fiduciary commitments.

Implementation Approach

- Create a pilot program between a subset of labs. Suggested option for pilot:
 - Align based on purpose (e.g., multi-purpose SC labs, NNSA/Security Labs)
 - Include at least one single purpose SC lab in pilot
- Metrics: Feedback from participants, increased number of collaborative proposals, increased collaborative publications, better recruiting outcomes and retention of staff within the DOE lab complex; qualitative assessment of burden vs benefit to home Lab and visiting Lab.

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