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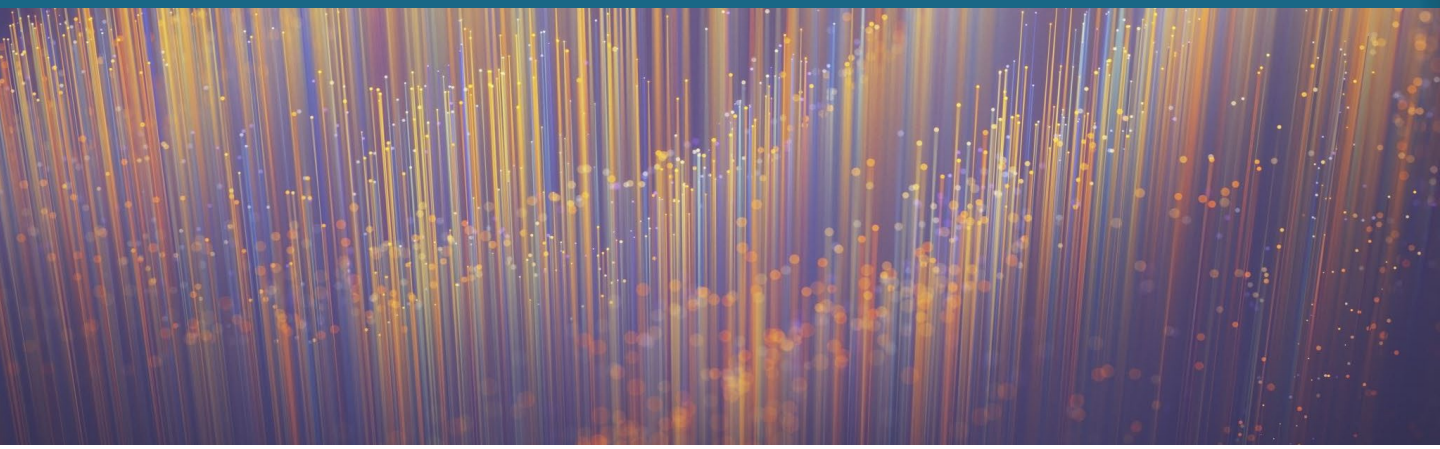

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SANDIA SYNERGY

A Newsletter Empowering Postdoctoral Associates to Advance Science & Technology at Sandia National Labs

Maximizing your Sandia Postdoctoral Research Experience: Insights from Former SNL Postdocs

The *Sandia Synergy* newsletter is created for postdoctoral associates at Sandia National Laboratories, to enlighten and empower postdocs as they leverage their current experience to navigate the transition to permanent professional positions.

This inaugural issue highlights valuable insights from a panel discussion of esteemed individuals who have traversed the path from postdoctoral researcher at Sandia to ST&E professionals across different sectors of the research ecosystem.

Our panelists shared individual experiences, challenges faced, and key strategies for exploring career goals, encouraging postdocs who are undecided about future career paths to use this time to engage fully and explore various career goals.

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A collaboration between Sandia's Postdoctoral Program Office and the Universities Research Association

Panelists

Dr. Jennifer Gaudioso is Director of the Center for Computing Research at Sandia National Laboratories where she stewards the Center's portfolio of research from fundamental science to state-of-the-art applications. She is also the Program Executive for NNSA's Advanced Simulation and Computing Program at Sandia. Jen began her Sandia career in 2002 as a postdoctoral researcher and moved into management in 2011. She has led a wide range of technical areas at Sandia, including the International Biological and Chemical Threat Reduction Program and the next-generation Nuclear Command, Control, and Communications (NC3) and coordinated a Sandia-wide emerging non-proliferation initiative at the interface of NA-10, NA-20, NA-80. Jen served on two National Academies Committees addressing biodefense issues and was an MIT Seminar XXI Fellow. She has a PhD and a master's degree in physical chemistry from Cornell University and a bachelor's degree in chemistry from Bard College. Jen's time at Bard taught her to value diverse perspectives in problem-solving.

Dr. Rebecca Caravan joined Argonne National Lab as an Assistant Chemist in 2020, following a NASA NPP postdoctoral fellowship at NASA Jet Propulsion Laboratory, California Institute of Technology. Prior to that she worked with Craig A. Taatjes in a 4-year postdoc at Sandia National Laboratories, Livermore in the Combustion Research Facility. At Argonne, her current research interests lie in laser technology development to study the kinetics and mechanisms of gas-phase reactions involving reactive intermediate species. She also collaborates on the Advanced Light Source at Lawrence Berkeley National Laboratory to gain fundamental chemical physics insights into what drives and influences reactions of intermediates.

Dr. Ellen Mazumdar is an Assistant Professor at Georgia Tech in the School of Mechanical Engineering with a courtesy appointment in the School of Aerospace Engineering. She graduated with her B.S., M.S., and Ph.D. from MIT and was a postdoc at Sandia National Labs in Albuquerque, New Mexico. She currently leads the Sensing Technologies Laboratory, which focuses on developing new diagnostic techniques for studying hypersonic environments, high temperature materials, energetic materials, combustion phenomena, and multiphase flows. She is a recipient of the ORAU Ralph E. Powe Junior Faculty Enhancement Award and the AFOSR Young Investigator Award.

Dr. Theron Rodgers is a Senior Member of Technical Staff in the Computational Materials Science Department at Sandia National Laboratories. He joined Sandia as a postdoc in 2015 and became a staff member in 2018. Theron's research focuses on simulating advanced manufacturing, quantifying material microstructures, and utilizing material information in engineering analyses. He has developed simulation methods for various advanced manufacturing techniques including vapor deposition, welding, plasma spray, cold spray, and additive manufacturing. During his career, he has coauthored 26 journal articles and released multiple applications in the open source SPPARKS code repository. As a postdoc, he served on the Sandia Postdoc Development Association board from 2015 to 2018 and later assumed the role of staff advisor from 2019 to 2023. Theron holds a B.S. in physics from the University of Missouri and a Ph.D. in Engineering Physics from the University of Virginia.

Dr. Angela Wu obtained her master's in mechanical engineering from California State University, Los Angeles, and her PhD in mechanical engineering from the University of Michigan, Ann Arbor. She was a postdoc at the Sandia National Lab in the Combustion Research Facility, and a member of the Sandia Postdoctoral Development. After her postdoc, she was a research engineer in the applications team of Convergent Science. Currently, she works at Hyundai American Technical Center as the University Research Specialist, to establish collaborations between HATCI and university researchers.

Transitioning from Postdoc to Independent Researcher or Professional

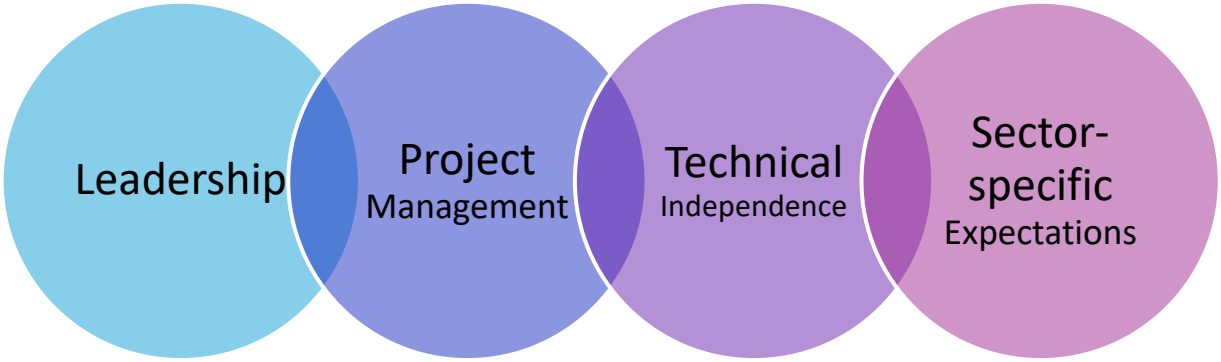

Figure 1. Navigating the transition from a postdoc to an independent role involves developing leadership, project management, and technical independence, as well as adjusting to sector-specific expectations.

Mentorship and Project Management

Strong mentorship during the postdoc phase is instrumental in preparing for independent roles. Advisors who encourage project leadership, proposal writing, and scientific ownership can help build the necessary skills for independence. For example, **Rebecca Caravan's advisor supported them in taking on scientific leadership and managing collaborative projects, which eased the transition to a Principal Investigator role at a national lab**. Such experiences foster confidence in initiating and leading projects.

Gradual Independence

Transitioning to independence often happens gradually. Postdocs initially work closely with advisors before gradually developing their own ideas and contributions, which helps smooth the shift from dependent to independent work. **Theron Rogers provided valuable perspective that postdocs may need to work on a fast-paced timeline of 2-3 years in contrast to the multi-year research strategies of lab staff.** This understanding is essential to focus efforts efficiently and align with broader projects even in a temporary role.

Technical Independence and Collaboration

Postdocs who gain independence in developing ideas and tackling complex problems find the transition smoother, especially when their skill sets complement rather than compete with their advisors. **Theron Rogers noted that his skillsets didn't overlap with his mentor's so that his staff transition didn't put him in competition for funding or opportunities.** This can help avoid conflicts over funding or research direction and establishes unique expertise. Collaborations established during the postdoc period often continue to be valuable in a new role, providing a support network of colleagues for project development and further research.

Sector-Specific Skills

Different sectors demand distinct skill sets. For those moving to industry, technical expertise in software or tools can be key, though learning client support or industry-specific workflows may still be necessary. In these roles, **transitioning from research dissemination (e.g., publishing papers) to client-facing support or technical problem-solving** is often part of the adjustment process.

"I am fortunate to have collaborations with a lot of amazing scientists, and some of these ongoing collaborations started in my postdoc with my mentor" Rebecca Caravan

Critical Skills to Build a Foundation for Research Independence, Collaboration, and Leadership

Grant Writing & Funding Acquisition

- Securing funding is a universally valued skill across all sectors. All panelists shared that postdocs should build proficiency in grant writing and learn the processes involved in obtaining research funds.
- Developing relationships with program managers and potential funding sources is essential for this cause.

Networking & Relationship Building

- Building an internal network is crucial, especially in national labs where projects often span multiple departments.
- Postdocs should actively seek connections across organizations and introduce themselves to colleagues, as even brief introductions can open doors for future collaboration. Reaching out proactively when an opportunity or project seems interesting can also be advantageous.
- In academia, this network can facilitate collaborative research, grant partnerships, and job prospects.

Effective Communication

- Communicating complex research concepts to managers and colleagues is essential, particularly in environments like national labs where managers may not be experts in a postdoc's specific field.
- Learning to distill complex ideas into clear, impactful summaries helps avoid miscommunication and could strengthen research collaborations.
- In academia, clear communication is important for effective teaching and grant proposals, while in industry, it's key for aligning research goals with business objectives.

Mentoring & Leadership

- Developing mentoring skills early is beneficial, as postdocs will often become mentors themselves. By understanding how a productive mentor-mentee relationship works, postdocs can better support students and junior researchers down the line.
- Experience as a mentee helps prepare for future leadership and teaching responsibilities in academia or national labs.

"Part of being successful at Sandia is developing an internal network to learn about different parts of the Lab. Learn how to connect with folks and politely introduce yourself and ask for a small amount of their time. If you see an interesting opportunity – don't hesitate to reach out. For example, LDRD committee members would much prefer you consult with them before spending a lot of time developing an idea that might be dead-in-the-water, e.g. maybe someone got funded to do very similar work the previous year!"
Theron Rodgers

Careers in Academia, Industry, or National Labs: Advantages & Challenges

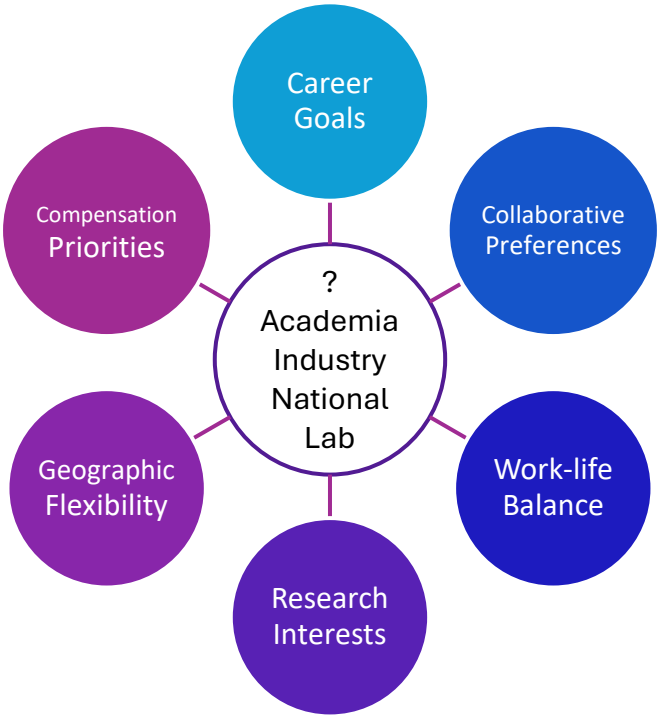

Figure 2. Key factors influencing the decision to pursue a career in academia, industry, or national labs.

Academia

Academia appeals to those who value **independence in setting research directions**, **teaching, and mentoring students** extensively. Academic careers offer leadership opportunities through lab management and grant acquisition. However, the demands of academia—such as **continuous grant writing, publication pressures,** and the challenge of securing tenure-track roles—can deter some. For individuals less interested in teaching or lab management, academia may be less appealing.

Industry

Industry roles typically offer **structured hours, competitive pay, and a focus on applied research** within set project parameters, providing stability and work-life balance. Researchers who value routine, financial security, and **minimal after-hours work** find industry roles attractive. However, the proprietary nature of research in industry can be limiting, as **sharing and collaboration with the wider community are often restricted**. There's also the possibility that the skills gained in academia or a postdoc may not directly transfer to an industry role, creating an adjustment period for those transitioning from more open-ended research environments.

National Labs

Many researchers are drawn to national labs for their focus on **collaborative science**, the **freedom to pursue challenging technical problems** without a profit-driven motive, and the opportunity to **develop open-source tools for the broader scientific community**. Positions at national labs offer the chance to engage with high-impact research and mentorship without the constraints of academia, such as formal teaching responsibilities. Additionally, national labs are often perceived to have a **favorable work-life balance**, with reliable hours and good benefits. However, challenges include the **limited availability of positions in specialized fields**, as these openings are often rare and competitive. Dual-career considerations also play a role, as relocating for national lab positions can be complex when both partners are researchers with specialized roles.

"You will find the ability to do teaching, mentorship, leadership, grant writing, and hands on research at all of these options, just in different amounts. You just need to decide how much of each you want to do."
Ellen Yi Chen Mazumdar

Work Culture, Expectations, & Work-life Balance

Academia

- Work culture is largely self-driven, where professors manage their own research agendas and student mentorship.
- Collaboration varies by field; those with shared, high-cost facilities tend to be more collaborative, while others are more independent.
- Work-life balance is **highly flexible** but depends on individual choices. Academics have **significant autonomy**, meaning they can shape their schedules, manage their workload, and take extended breaks if they prioritize time management and goal-setting. However, this autonomy can lead to either healthy work-life balance or burnout, depending on personal boundaries. The absence of strict oversight means that academics must self-regulate their time and workload.

Industry

- Industry is characterized by a faster pace and more frequent deadlines, **driven by the immediate needs** of clients or project requirements. Projects in industry tend to be smaller and require rapid turnaround, which contrasts with the slower, more in-depth exploration typical in academia or national labs. This environment demands broad expertise rather than specialization, as professionals frequently switch focus and **adapt quickly** to new challenges.
- Work-life balance is typically better-defined, with **clear boundaries around work hours** and minimal expectation to take work home. The structure allows employees to focus on their designated hours, supporting a consistent balance between work and personal life.

National Laboratory

- National labs promote a collaborative environment where **self-motivated work is expected**, with **minimal competition or political tension** compared to academia and industry.
- Employees often work on numerous projects simultaneously, creating a fragmented workload that can make it challenging to achieve in-depth progress on any single project. Managers at national labs are generally supportive but rely on individuals to communicate when they are overextended.
- **Collaborative work is rewarded, and the overall culture encourages teamwork** across different roles, including support from interns and technologists to balance responsibilities.
- Work-life balance is generally good, but maintaining focus across multiple projects can be a challenge.

Strategies for Networking and Professional Relationship-Building

"Intentionally enrolling in classes played a crucial role in growing my network. For instance, I took the "Nuclear Weapons for Managers" class, which, despite not being directly related to my field, allowed me to meet people from various parts of the lab. Leadership courses like "Crucial Conversations" were also excellent opportunities to connect with colleagues across the laboratory. Even in online classes, you can network by following up with classmates who shared interesting stories. A simple invitation for a coffee chat can go a long way. The key is to be willing to put yourself out there and take the initiative to connect with others."
Jennifer Gaudioso

- ✓ **Maintain Relationships:** Keep in touch with contacts made during graduate studies, your postdoc, and beyond.
- ✓ **Utilize Open Environments and Initiate Meetings** : Take advantage of the accessibility of colleagues at Sandia for casual discussions and inquiries.
- ✓ **Leverage Advisors**: Use your advisors' networks to gain introductions and attend conferences together.
- ✓ **Engage in Conferences**: Attend to meet researchers and potential collaborators; propose and organize sessions to increase visibility.
- ✓ **Visibility is Key**: Actively promote your work and research to ensure recognition and potential collaborations.
- ✓ **Seek Introductions**: Gain friendly introductions at conferences to expand your network; mutual contacts can enhance response rates for outreach.
- ✓ **Use Online Platforms**: Engage with professionals on platforms like LinkedIn to create connections and opportunities.
- ✓ **Recognize Luck**: Understand that chance can play a role in job opportunities, as demonstrated by both networking and cold applications.
- ✓ **Overcome Introversion**: Make an effort to connect with others, even if it feels challenging; asking questions can lead to meaningful conversations.
- ✓ **Participate in Classes**: Enroll in courses, even if not directly related to your field, to meet diverse colleagues and expand your network.
- ✓ **Follow Up**: After online classes, reach out to classmates for coffee chats to build connections.
- ✓ **Take Initiative**: Be proactive in networking by reaching out and expressing interest in others' work.

Proactive Positioning to Take Advantage of Emerging Trends

By combining awareness of emerging trends with strategic networking, skill-building, and alignment with mission-driven projects, postdocs can position themselves to thrive in new and evolving research areas. Below are some proactive measures you can take!

Engage Early in Emerging Areas

Identify and align with "hot" or rapidly growing fields early to gain a significant advantage.

Attend conferences, review program funding sources (like LDRD, NSF, and SBIR), and participate in program reviews to gain a sense of which topics are gaining traction.

Understand Mission-Driven and Fundamental Work

For national labs, understanding how fundamental research aligns with broader mission-driven objectives is essential.

Learn about departmental focus areas, participate in relevant project meetings.

Leverage Internal Networking and Special Opportunities

National labs offer unique networking opportunities, such as Joint Working Group meetings in areas like nuclear deterrence, which provide insights into current needs and trends.

Connect with colleagues and managers about mission-relevant focus areas.

Build Unique, Cutting-Edge Skills

Emphasize distinctive technical skills, such as advanced data analysis or programming in Python to highlight your valuable capabilities.

This approach enhances your appeal as contributors to forward-looking research projects.

Stay Informed on Industry and Political Trends

Monitor industry developments and funding trends and political news, e.g. via newspapers and LinkedIn to stay attuned to shifts in research priorities.

Connect with industry professionals and exploring interdisciplinary areas to broaden perspective on where the field is heading.

"Connect with industry professionals on LinkedIn, see what people are talking about on the news, follow politics because this affects funding and can impact your area. Explore research areas outside of your expertise to see what people are working on and where they think the field is going."
Angela Wu

In hindsight…

"Looking back, if I could do my postdoc with more intention, I would focus on networking and exploring the broader aspects of Sandia much more than I did. At the time, I was deeply immersed in my research and didn't consider staying at Sandia long-term. My primary focus was on getting my work published. I was preparing a job packet and applying for university positions at institutions that seemed like a good fit for the research I wanted to pursue. In doing so, I missed out on some exciting developments at Sandia. If I had been more curious and engaged with the wider community there, I think I would have been better prepared."

"A good way to get to know other researchers in adjacent fields is by helping to organize a conference, or a session at a larger conference. It is a good service to your community, you can have the opportunity to work with other researchers in co-organizing a session on a topic that you find exciting, and it helps you find other researchers who are also excited about that topic too."

"I would have done more writing, traveling, and networking."

"I wish I got more practice at collaborative proposal development. I'm pretty good at communicating to managers about what I'm doing but I'm much worse at working with them to understand needs and desires while developing a project or proposal. I still have a fear of "being wrong" that I feel the need to overcome when working on selling proposals to others."

"Broaden your job search - My second job after the postdoc is completely different from my first job. I wasn't satisfied with my first job, so probably should have applied to more jobs (with different titles) instead of pigeonholing myself to specific roles."

Considering Careers at the Intersection of National Labs and Science Policy?

Understand Policy and Funding Contexts
Engaging with government relations teams is valuable for understanding both the internal dynamics of national labs and the broader funding ecosystem. Working closely with mentors and managers to understand sponsor priorities also provides insight into what drives research funding.

Consider Policy Fellowships
Programs like the AAAS Science & Technology Policy Fellowships offer exposure to federal policy, which can be pivotal for transitioning into science policy roles. This may mean stepping away from the lab temporarily, but the experience can broaden career options in both labs and government.

Develop Communication Skills
Clearly articulating the impact of scientific work to general audiences and policy stakeholders is essential. Strong communication skills help bridge the gap between scientific research and policy-making.

Interested in developing Science Communication skills?
Stay tuned for the **Science Communication Series** for SNL postdocs coming in Spring 2025!

If you have ideas for newsletter topics, feel free to reach out to us at ura@sandia.gov