

ELIZABETH R. CANTWELL



The diverse and complex challenges facing S&T and its translation to societal value today, require unique leaders. Exemplified by some of the struggles we experience in higher education, these challenges require leaders who can both look outside of their institutions for new solutions and innovations and understand the cultural and cognitive aspects of bringing lasting change to knowledge institutions that have core, unchanging societal value. I have enormous passion for and capacity to address these complex challenges, and I am keenly motivated by service to the higher education mission. I relish the role of boundary broker, and have the ability to deliver new ideas into large organizations, marshalling people and resources to deliver effective programs and solutions. I understand, design and execute boundary constructs within large knowledge organizations that facilitate cooperation across stovepipes and greatly enhance impactful collaborations.

EDUCATION

University of Pennsylvania

MBA Wharton School Finance & Entrepreneurship

University of California, Berkeley

PhD Mechanical Engineering

University of Chicago

BA Human Behavior

INSTITUTIONAL SERVICE

- Member, National Academy Aeronautics and Space Engineering Board (ASEB), 2013 - Present
- Guest Scientist, Lawrence Livermore National Lab, 2015 - Present
- Member, National Academy Division on Engineering and Physical Sciences (DEPS) Board, 2010 - 2016
- Member, National Academy Space Science Board (SSB), 2007 - 2013
- Member, National Research Council Panel to Track and Assess Governance and Management Reform in the Nuclear Security Enterprise, 2016 - 2017
- Co-Chair, National Research Council Committee on Space-Based Additive Manufacturing, 2014
- Co-Chair, National Research Council Decadal Study in Life and Physical Sciences Space Research, 2009 - 2011
- Member, National Research Council Committee on Human Spaceflight Technical panel, 2013 - 2014
- Committee to Review NASA's Exploration Technology Development Program, 2008
- Committee on Review of NASA's ISS Roadmap, 2006
- IOM Committee on the Review of NASA's Bioastronautics Critical Path Roadmap, 2004 - 2005

Technical Reviewer

- National Academy of Sciences
- American Water Works Association Research Foundation
- NASA
- Combustion Science and Technology
- Society of Automotive Engineers

Current Board Memberships

- NASEM/Aeronautics & Space Engineering Board
- AURA/Space Telescope Science Institute
- Global Pathways Institute
- Center for Carbon Removal
- The MILO Space Science Institute

EXPERIENCE

University of Arizona, Tucson, AZ

Professor of Practice, School of Engineering

8/2019 - pres

University of Arizona, Tucson, AZ

Senior Vice President, Research and Innovation

8/2019 - pres

Established in 1885, the University of Arizona, is state's land-grant university. UA is advancing the frontiers of interdisciplinary scholarship and entrepreneurial partnerships and is a member of the Association of American Universities. UA's annual budget is \$2.2 billion, and it enrolls 45,000 students each year; recognized as a global leader, the UA is also a leader in research, bringing more than \$622 million in research investment each year. UA benefits the state with an estimated economic impact of \$8.3 billion annually.

I lead the entirely new office at UA called Research, Innovation and Impact. This office works to (i) integrate research and development funding across government, commercial, and not-for-profit funding sources to bolster new discoveries; (ii) manage the University's Office of Research, the Corporate Engagement Programs, Tech Launch Arizona, and the University's research parks and Center for Innovation; (iii) bring discoveries to market through collaborative research, licenses to growth companies and creation of new companies; and (iv) enhance the innovation economy in southern Arizona.

We advance knowledge and its impacts, and have the following mission:

- To advance knowledge through stimulating the highest quality thought leadership, research and scholarship across a wide range of challenges and disciplines.
- To develop knowledge innovators through innovation and entrepreneurship programs in which emerging scholars, UA faculty and State and Regional innovators are trained, mentored and supported to realize their highest potential and assume roles as innovative leaders who take responsibility for solving society's biggest challenges.
- To create knowledge impacts through partnerships, local and global engagement and knowledge transfer that will improve quality of life and enhance the economies of Arizona, the US and the world. I lead, stimulate, and nurture the culture and capacity for knowledge creation and discovery at the University, creating industry and public partnerships, and moving inventions and technologies to the marketplace.

Arizona State University Enterprise Partners (ASURE), Scottsdale, AZ

Chief Executive Officer

4/2017-8/2019

ASURE is a 501.c.3 applied research unit. ASURE specializes in conducting classified and midrange technology readiness level (TRL) services for the defense and security industry. This growing unit

supports commercial and government clients, with a particular focus on maturing and improving advanced technology products that provide truly innovative advancements for our sponsors. ASURE's cleared staff have domain expertise in military and federal network integration, intelligence, surveillance and reconnaissance; data and services; operations and information assurance; and command and control.

- Provide strategic leadership by working with the ASURE board of directors, ASU leadership and the academic units across ASU to establish long-range goals, strategies, plans and policies. We are focused on growing ASURE to encompass advancement of a portfolio of institutional level initiatives and lead the pursuit of new partnerships and resources to advance those initiatives.
- Responsible for building the contracts, security envelope and facilities necessary to meet the needs of our initiatives and drive ASU innovations into large to extremely large programs, specialized contracts, complex consortia, unique business models and classified work.
- ASURE also has a special role linking the workforce needs of our DoD and Intelligence sponsors with the unique higher education capacities at ASU. We are becoming well known for bringing innovation to bear on difficult problems as well as bringing young innovators into national security challenges.

Arizona State University, Tempe, AZ

Professor of Practice, School for the Engr of Matter, Transport and Energy
Affiliate, School for Earth and Space Exploration

2/2015 – 8/2019
 2/2016 – pres

Arizona State University, Tempe, AZ

Vice President, Research Development

2/2015- 3/2018

ASU is a new model for a 21st century research university with a unique portfolio of interdisciplinary institutes and initiatives, corporate engagement programs, and support for the creation of new businesses. This fusion of people and ideas leads to innovation-driven and use-inspired activity that allows ASU and its institutional, industry and community partners to address society's most pressing challenges while ensuring competitiveness in the global knowledge economy. As a Vice President within Knowledge Enterprise Development,

- Created teams across all disciplines within the ASU academic community, working closely with faculty, academic leaders, institute and initiative leaders and center directors to execute strategies for large partnerships and projects, in pursuit of significant increases in research support.
- Created a growth and partnering strategy for research at ASU that focused on National Security, Health and the Energy/Water Nexus, to both develop ideas for strategic, large initiatives (scale and impact) and then to capture and execute these projects.
- As part of advancing the university's research portfolio, I established close working relationships with Entrepreneurship & Innovation (E+I) activities at ASU, the ASU Foundation, corporate relationship initiatives and Arizona Technology Enterprises (AzTE, the tech transfer arm of ASU, now called Skysong Innovations).
- The sponsored research at ASU grew by more than \$150M during my tenure and now totals more than \$610M/year.

Lawrence Livermore National Laboratory (LLNL) Livermore, CA

Director, Office of Economic Development, Director's Office

6/2013-1/2015

The Office of Economic Development was created in 2013 to facilitate the increased integration of many of the Laboratory's existing functions involving intellectual property management, licensing, sponsored research, and cultivation of partnerships with businesses, industries, entrepreneurs,

economic development organizations, and higher education institutions. In reality, this organization was created to expand LLNL's access to talent and innovation and impact in the innovation ecosystem of the LLNL region by integrating all of the above elements and enhancing the Lab's access to Silicon Valley.

- Routinely focused on critical Public-Private Partnership initiatives involving the Livermore Valley Open Campus, Academic Alliances, Entrepreneurial Leave and the development of mission-enhancing initiatives with the private sector such as the California Network for Manufacturing Innovation.
- Greatly accelerated the growth and strengthening of partnerships with regional industry and academia.
- This role included oversight the Industrial Partnerships Office (IPO), which managed all of the Laboratory's technology transfer activities and the High Performance Computing Innovation Center (HPCIC), a new Institute commissioned by the Laboratory for commercial partnering to solve grand challenges with high performance computing resources.
- Responsible for developing and championing all of the external community stakeholder activities and partnership for LLNL.
- Developed enduring processes to create, evaluate, get buy-in and determine potential implementation pathways for new substantive initiatives, both internally and externally.
- Bridged national policy developments, program development and growth strategies, finance and cost models, development of the workforce of the future, operations strategies and infrastructure development.

Lawrence Livermore National Laboratory (LLNL) Livermore, CA
Director for Mission Development, Engineering Directorate

8/2010 – 6/2013

The Engineering Directorate is a key component of the matrix management structure at LLNL, with ~1600 employees who serve all of the missions at the Laboratory with R&D, technology development, systems implementation, standards development and engineering fabrication. My main areas of program development focus were nuclear nonproliferation technologies, energy, advanced manufacturing and advanced laser options for the DoD.

- Responsible for the leadership and oversight of strategic plans, innovative technology development approaches and private sector program development aspects of the Engineering Directorate.
- Maintained and built effective and collaborative partnerships with Laboratory leaders, managers, and staff and with regional universities, potential partners, government, and industrial officials.
- Successfully passionate about enabling the culture shift necessary to move from solely a service-based model for the directorate to an expanded model enabling the Engineering Directorate to become an innovation hub for the Laboratory.
- These efforts resulted in the directorate producing far more high quality internally-funded Laboratory Directed Research & Development (LDRD) ideas, tripling the Directorate's overall LDRD funding to up to \$40M/year. These investments funded new initiatives such as additive manufacturing (3D-printing) - currently a ~\$200M funded program in the DOE/NNSA budget.

Oak Ridge National Laboratory (ORNL) Oak Ridge, TN
Deputy Associate Laboratory Director, Global Security Directorate

6/2008 - 8/2010

The Global Security Directorate's mission at ORNL is to provide strategic leadership, expert project management and technical expertise to develop new business within the government and private sector consistent with Oak Ridge National Laboratory's science portfolio and the U.S. national security

strategy. Over half of this portfolio was built on ORNL's long history in nuclear fuel cycle research and development (R&D), nuclear material processing and characterization, and radioisotope production. The nuclear security portfolio focused on development and deployment of technology that enhanced nuclear nonproliferation and safeguards, reduced threats to nuclear material and facilities at risk and expanded national capabilities in radiation detection and nuclear forensics.

- The Directorate had an execution portfolio of ~\$400M and key stakeholders in DoD, DHS, DOE, the Intelligence Community and the private sector.
- Led the multi-sector business development efforts of the Global Security Directorate at ORNL.
- Matched ORNL capabilities with Global Security sponsor's gaps, shortfalls, and requirements, bundling capabilities to enable holistic or "system" solutions, pursuing the grand challenges worthy of a National Lab and optimizing the development of the next generation of science.
- Significant commercial interactions both in the search for programmatic partners and as sources of unique funding.
- Engagement with ORNL's 9 University partners to ensure university engagement across the entire portfolio

Los Alamos National Laboratory (LANL) Los Alamos, NM
Director, Office of Strategy, Threat Reduction Directorate

9/2007- 6/2008

The Threat Reduction (now Global Security) Directorate at Los Alamos was an ~1000-person organization focused on "mission-driven science for global threat reduction." Successes were measured through quantifiable improvements in national ability deter, detect, and mitigate the threat of weapons of mass destruction, as well as other asymmetric threats to the nation's well-being. The vast majority of LANL's Threat Reduction research and development was in support of technologies for detecting and monitoring nuclear materials, nuclear processes and nuclear explosions around the world.

- Threat Reduction had an execution portfolio of ~\$700M, and key stakeholders in DOE/NNSA/NA, DHS, DoD, and the intelligence community.
- Lead the Threat Reduction (TR) strategic development strategies, including program pivots and growth, and planning for implementation across the entire Laboratory.
- Primary focus on new programmatic initiatives. Represented integrated LANL capabilities broadly to sponsors of new and existing TR programs.
- Developed and implemented program execution tools that allowed TR program growth to be executed efficiently with broad Laboratory participation.

Los Alamos National Laboratory (LANL) Los Alamos, NM
Division Leader, International, Space & Response Division

9/2006 - 9/2007

The International, Space and Response (ISR) Division at Los Alamos National Laboratory develops and deploys space missions for government agencies such as NASA, the DOE and the DoD. I served as part of the Threat Reduction senior management team, responsible for execution of projects from small PI-driven basic science through delivery of large satellites and instruments into the space environment and other field deployments.

- The ISR Division consisted of 430 people with a budget of approximately \$120M, and provided science-based solutions, capabilities, and expertise in remote space applications.
- Responsible for program execution across the entire ISR portfolio, including project management, strategic planning and execution of those plans for new business opportunities, and resource planning and allocation.

- Worked with senior Program leaders and ISR management to maintain and strengthen the S&T base for ISR activities, managed and developed the largely PhD-level workforce, and planned for and executed new science facilities.
- Identified and developed relationships with external and internal customers, promoted and lead new initiatives and created national recognition for ISR's capabilities.
- Managed ISR Division through extremely fiscally constrained period, without adversely impacting capability. Set up lean management structure to accomplish all elements of project/program execution as well as keep core space science capability available for new missions. As a consequence, retained all high-value personnel.

Los Alamos National Laboratory (LANL) Los Alamos, NM
Manager for Contractor Transition, Threat Reduction Directorate 1/2006 - 6/2006

The Threat Reduction Associate Director (AD) at LANL was both an existing manager and a member of the new management team that took over the Los Alamos National Laboratory contract effective 6/1/2006. The AD required a backup for matters associated with the new management team in the period prior to the transition date.

- Established and conducted processes for identifying new organizational structure for the then-1200-person Directorate and mapped all employees into the new structure.
- Worked with senior managers from new contract team to establish transition processes across the Laboratory
- Created processes for team-building for new Threat Reduction management team pre- and post-transition

Los Alamos National Laboratory (LANL) Los Alamos, NM
Deputy Division Leader, International, Space & Response (ISR) Division 6/2005 - 9/2006

Part of ISR's senior management team, responsible for operations management and integrating research and capabilities for ground and satellite-based radiological, nuclear and chemical detection across disciplines both within and external to the Division to produce compelling solutions to critical strategic national security needs.

- Managed finance and HR for 550-person organization.
- Conceived, planned and conducted studies that substantially impacted ISR's R&D strategies.

Lawrence Livermore National Laboratory (LLNL) Livermore, CA
Section Leader, Center for Micro and Nano Technology 2/2000 - 6/2005

Management lead for research, operations, staffing and strategy for 50-person microfabrication R&D laboratory supporting basic & applied research, national security, nuclear weapons research and optics development. Line manager for five groups in the Engineering Directorate

- Developed technology R&D roadmaps and strategic research plans for keeping the Center viable and effective in an era of difficult financial, operational and policy constraints
- Conduct business process improvement studies for mission-critical LLNL R&D programs

Lawrence Livermore National Laboratory (LLNL) Livermore, CA
External Relations, Homeland Security Organization (HSO) 3/2002 - 6/2005

One of small team of individuals selected to create the Homeland Security Organization at LLNL

- Developed and implemented relationship strategies for industry, state and local partners
- Spearheaded initiatives with state and local government agencies
 - First Responders, Bay Area Water Agencies, Bay Area Regional Homeland Security, Bay Area Economic Development Agencies, State of California
- Developed operational concepts (actionable plans) for transitioning Homeland Security R&D to users
- Large Scale Infrastructure Assessments - lead security experts in threat, vulnerability & risk assessments of integrated infrastructure (e.g., energy, water and transportation)

NASA Headquarters *Washington, DC*
Program Manager, Office of Biological and Physical Sciences *1998 - 2000*

Lead \$40M technology R&D program in environmental/medical sensors for crewed missions, technology R&D for human support technologies for advanced missions

- Directed research portfolio across four NASA Centers in Air, water and waste recycling, habitat controls, human factors design and extravehicular suits
- Crafted new model for rapid transition of basic research into NASA missions – strong emphasis on rapid adoption of new technology in human flight missions
- Developed goals, objectives, and research strategy; Coordinated activities among NASA, DARPA, DOE, DOD, NIH, NSF; worked with NASA management and Congress; developed metrics for OMB
- Provided science and technical oversight to ground and flight projects
- Analyzed/integrated biology and engineering for medical care, monitoring air, water and microbes, and autonomy/reliability

Lawrence Livermore National Laboratory (LLNL) *Livermore, CA*
Research Engineer, Environmental Protection Department *1994 - 1998*

Conducted research in cost/benefit analyses for environmental risks, environmental sensors, database development & management, Design for Environment, groundwater system reliability, and pollution prevention for metal finishing, printed circuit boards, electronics production and paint facilities

US Environmental Protection Agency (USEPA), Region IX *San Francisco, CA* *1992 - 1994*
Lead Engineer, New Projects, Air Division

Managed Clean Air Act Permit Program for parts of California, Nevada, Arizona & Hawaii

- Prime technical interface between Regional Air Boards and EPA attorneys
- Developed risk assessment strategies for human health/engineering equipment safety, PRA, FMEA

NASA, Ames Research Center *Mt. View, CA* *1984 - 1992*
Research Engineer/Project Manager, Life Sciences Division

- Managed projects in decision analysis, design and construction of experimental facilities to simulate complete human life support systems
- Extensive research in Spacecraft Fire Safety led to successful Space Shuttle experiments in smoldering combustion
- Participated in post-Challenger PRA

PUBLICATIONS & PRESENTATIONS

Publications and presentations span the disciplines of low gravity combustion and fluid mechanics, aeronautics, aerospace systems, integrated life and physical sciences, human support systems, satellite systems (all classified), spacecraft sensors and sensor systems (some classified), energy and infrastructure security, environmental standards, carbon removal & reuse, commercial space, advanced manufacturing (some classified), technology translation, innovation ecosystems, public/private partnerships, economic development, innovation for defense and national security.