

# NSF Business and Operations Advisory Committee

Electronic Book  
Virtual Meeting  
January 21, 2022

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**National Science Foundation  
Business and Operations Advisory Committee**

Virtual Meeting  
January 21,  
2022 Zoom

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**Friday, January 21, 2022**

1:00 pm      **Welcome/Introductions/Recap**  
*Co-Chairs: Pamela Webb and Maureen Wylie*

1:05 pm      **Subcommittee on NSF's Information Technology and Enterprise Architecture Strategy**

The subcommittee was charged to prepare a bulleted list of recommendations regarding the direction of IT at NSF, and/or suggestions for leading-edge technologies on the horizon for potential implementation in the next budget year. Presently, these recommendations will inform NSF's Capital Planning and Investment Control (CPIC) Board as they identify those ideas to pursue in the upcoming FY 2024 budget year.

The subcommittee has reviewed the NSF IT Strategy and related Architecture to provide informed recommendations for changes in process, direction, and/or potential investment in new and emerging technologies.

Committee Action/Feedback:

- The BOAC liaison (Tilak Agerwala) submitted the subcommittee's recommendations to the BOAC co-chairs (via NSF BOAC staff) on January 17, 2022, and on behalf of the co-chairs, NSF BOAC staff shared it with the full BOAC as a pre-read for this meeting.
- During the meeting, the BOAC liaison will present a summary of the subcommittee's findings and recommendations and discuss and deliberate the subcommittee's advice.
- At the close of the BOAC's discussion, the BOAC will:
  - Accept the subcommittee's recommendations;
  - Reject the subcommittee's recommendations; or
  - Send the subcommittee's recommendations back to the subcommittee for revisions.
- The BOAC may also provide additional written feedback to NSF, including any comments or opinions the BOAC has to offer regarding the report or its findings and recommendations by way of a cover letter to the NSF Designated Federal Officers (DFOs).
- Once the recommendations are accepted, the BOAC will submit them to NSF for the agency to make it publicly available.
- After receiving the recommendations, the NSF DFOs may, verbally or in writing, comment on or respond to them at any duly organized BOAC meeting.

*Presenter and Discussant: Tilak Agerwala, BOAC*

2:00 pm      **Adjourn**

## **NSF Business and Operations Advisory Committee Membership List and Contact Information**

**Dr. Tilak Agerwala**

IBM Emeritus and IBM Vice President (Retired)

TKMA Consulting, LLC.

Email: [tilak.agerwala@gmail.com](mailto:tilak.agerwala@gmail.com)

*Appointment Date: June 2019*

*Term Expires: December 2024*

**Dr. Benjamin L. Brown**

Director, Facilities Division, Advanced Scientific Computing Research

U.S. Department of Energy, Office of Science

Email: [ben.brown@science.doe.gov](mailto:ben.brown@science.doe.gov)

*Appointment Date: December 2017*

*Term Expires: December 2023*

**Dr. Shawn T. Brown**

Director, Pittsburgh Supercomputing Center, Carnegie Mellon University

Vice Chancellor for Research Computing, University of Pittsburgh

Email: [stbrown@psc.edu](mailto:stbrown@psc.edu)

*Appointment Date: January 2022*

*Term Expires: December 2024*

**Dr. Robert M. Dixon**

Consultant

Higher Education Management

Email: [dr.robertmdixon@yahoo.com](mailto:dr.robertmdixon@yahoo.com)

*Appointment Date: May 2017*

*Term Expires: December 2022*

**Ms. Sabrina Ellis**

Vice President and Chief Human Resources Officer

New York University

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*Appointment Date: January 2022*

*Term Expires: December 2024*

**Mr. Adam H. Goldberg**

Director and Executive Architect

U.S. Department of the Treasury

Office of Financial Innovation and Transformation

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*Appointment Date: May 2017*

*Term Expires: December 2022*

**Mr. Larry Koskinen**

Retired Federal Executive and Risk Management Consultant

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*Appointment Date: June 2020*

*Term Expires: December 2022*

**Mr. Robert Lavigna**

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*Appointment Date: June 2020*  
*Term Expires: December 2022*

**Ms. Rachel E. Levinson**

Executive Director, National Research Initiatives  
Arizona State University  
Email: [rachel.levinson@asu.edu](mailto:rachel.levinson@asu.edu)  
*Appointment Date: May 2017*  
*Term Expires: December 2022*

**Mr. David Mayo**

Senior Director for Research Administration  
California Institute of Technology  
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*Appointment Date: June 2020*  
*Term Expires: December 2022*

**Dr. Joseph P. Mitchell, III**

Director of Strategic Initiatives  
National Academy of Public Administration  
Email: [joe.p.mitchell2007@gmail.com](mailto:joe.p.mitchell2007@gmail.com)  
*Appointment Date: April 2018*  
*Term Expires: December 2023*

**Ms. Kim Moreland**

Associate Vice Chancellor, Director  
Research and Sponsored Programs  
University of Wisconsin – Madison  
Email: [kmoreland@rsp.wisc.edu](mailto:kmoreland@rsp.wisc.edu)  
*Appointment Date: May 2016*  
*Term Expires: June 2022*

**Dr. Robert Nobles**

Vice President for Research Administration  
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*Term Expires: December 2024*

**Ms. Karin O’Leary**

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*Term Expires: December 2024*

**Dr. Theresa A. Pardo**

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**Dr. Gregory Parham**

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*Appointment Date: January 2022*  
*Term Expires: December 2024*

**Mr. William J. Valdez**

President  
Global Innovation Associates, LLC.  
Email: [billvaldez777@hotmail.com](mailto:billvaldez777@hotmail.com)  
*Appointment Date: June 2020*  
*Term Expires: December 2022*

**Ms. Pamela A. Webb\***

Associate Vice President for Research  
University of Minnesota  
Email: [pwebb@umn.edu](mailto:pwebb@umn.edu)  
*Appointment Date: January 2017*  
*Term Expires: December 2022*

**Ms. Maureen E. Wylie\***

Federal Chief Financial Officer (Retired)  
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*Appointment Date: June 2020*  
*Term Expires: December 2022*

**\* Committee Co-chairs**

## NSF Business and Operations Advisory Committee Member Biographies ~ January 21, 2022



**Dr. Tilak Agerwala**  
*IBM Emeritus and IBM Vice President (Retired)*  
*TMKA Consulting, LLC.*

Tilak Agerwala's career has focused on developing advanced research programs and game-changing strategic initiatives and on bringing innovative computing technologies to market. With the rapid "digitalization" of our world and the transformative impact this is having, Tilak is interested in applying big data, modeling, simulation, analytics, and augmented intelligence technologies to world class science and engineering, education, and leadership development. He is an IBM Emeritus, Executive-in-Residence, Grove School of Engineering, City College of New York, Adjunct Associate Professor, Pace University, New York, Adjunct Professor, National Institute for Advanced Studies, Bangalore, and Member, TKMA Consulting.

In his IBM career, spanning 35 years, Tilak held executive positions in research, strategy, advanced development, marketing, and business development. He was part of and led teams that developed and delivered leadership cyberinfrastructure technologies and supercomputers to industry, academia, and the national labs. As vice president, Systems, (2002 to 2013), he was responsible for IBM's research and advanced technology activities worldwide in future systems hardware and software technologies, including the BlueGene supercomputer. As vice president of Data Centric Systems (2013-2014) his team established a new paradigm for scalable systems leading to the delivery of the powerful supercomputer, Summit, to Oakridge National Lab.

Tilak is a member of the NSF Advisory Committees on Engineering, Advanced Cyber Infrastructure, and Business and Operations. He was the 2019 Dr. S. Radhakrishnan Chair Visiting Professor at the National Institute of Advanced Studies, Bangalore India. He is a Life Fellow of the IEEE and a recipient of the W. Wallace McDowell Award from the IEEE Computer Society. He has given well over a hundred invited presentations, keynotes, and distinguished lectures at conferences, universities, and national laboratories worldwide.

He has a Bachelor of Technology in electrical engineering from the Indian Institute of Technology, Kanpur, India and a Ph.D. in electrical engineering from Johns Hopkins University. From 1975-78, he was assistant professor of Electrical Engineering at the University of Texas, Austin.



**Dr. Benjamin L. Brown**  
*Director, Facilities Division, Advanced Scientific Computing Research*  
*U.S. Department of Energy, Office of Science*

Dr. Benjamin L. Brown is the Director of the Facilities Division in the Office of Advanced Scientific Computing Research (ASCR). The Division conceives, constructs, and operates world-leading open-access supercomputing, data, and networking facilities to enable the DOE mission and the national research enterprise. The Division's \$575M (FY 2021) budget is devoted to operations and major upgrade projects at each of the ASCR Facilities. As Director, Ben leads strategic planning, budget formulation, and operational oversight of these strategic national resources. He is a member of the federal Senior Executive Service.

Ben is also the program manager for the Department's Project Leadership Institute, a leadership development program in project management. Ben has extensive knowledge and expertise in policy development and analysis related to large scale scientific research infrastructure and project management. A common focus in each of these roles is the strategic advancement of science and the DOE mission through cross-institutional knowledge-sharing, strategic planning, and partnership development.

## Member Biographies

Immediately prior to joining the Office of Science in 2008, Ben worked on energy and climate policy in the U.S. Senate as an American Association for the Advancement of Science (AAAS) Congressional Fellow. Ben is a physicist with experience working in U.S. government laboratories and academic institutions in both the U.S. and U.K; his research focused on optical control of quantum systems and quantum information science. He received his Ph.D. in optics from the University of Rochester and his bachelor's degree in physics from Harvard University.

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### **Dr. Shawn Brown**

*Director, Pittsburgh Supercomputing Center, Carnegie Mellon University  
Vice Chancellor for Research Computing, University of Pittsburgh*

Dr. Shawn T. Brown is the Vice Chancellor for Research Computing at the University of Pittsburgh and the Director of Pittsburgh Supercomputing Center at the Carnegie Mellon University & University of Pittsburgh. Prior to his appointment, Dr. Brown served as the Associate Director of Research Software Development at the McGill Centre of Integrative Neuroscience at the McGill Neurological Institute. Dr. Brown is an expert on high-performance computing and computational simulation. He has over 25 years of experience in developing software to support the use of high-performance computing for research in areas such as chemistry, bioinformatics, and public health. His research interests are also focused on how agent-based modeling and other computational techniques can be used to provide decision support in public health and chronic disease. He received his Ph.D. in theoretical chemistry from the University of Georgia and his Bachelor of Chemistry at Bethany College.

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### **Dr. Robert M. Dixon**

*Consultant  
Higher Education Management*

Robert M. Dixon is a consultant with the Registry for College and University Presidents, which is based in Peabody, MA. Here, he takes on interim leadership assignments at universities that need senior level management while in transition. Among his assignments, he has served as Interim Provost and Vice President for Academic Affairs at Cheyney University and as Vice President for Academic Affairs at the University of Maine at Fort Kent. He is currently serving as Interim Chair of the Department of Industrial and Systems Engineering at North Carolina A & T State University. During the last decade he has developed research interests in Number Theory. His career has involved dual paths of work in teaching and research, and in administrative leadership positions.

He received a baccalaureate degree in mathematics and physics with high honors from Morehouse College; a Master of Science degree in nuclear physics from Rutgers University; and a doctorate in theoretical nuclear physics from the University of Maryland. Dr. Dixon formerly served as the Dean of the School of Science at Hampton University. Prior to Hampton, he was Provost and Vice President for Academic Affairs at Grambling State University. During a period of 16 years, he was Chair of the Department of Physics at Morehouse College, a period that was characterized by considerable success in the production of graduates in the dual-degree engineering program with the Georgia Institute of Technology, in the production of graduates in physics and mathematics, and the acquisition of funded grants from foundations and federal agencies. In this period, he received funding from the Air Force Office of Scientific Research, the Army Research Office, the Office of Naval Research, the AMOCO Foundation, the General Electric Fund, the William Penn Foundation, and the Sherman Fairchild Foundation. His background includes appointments at Morgan State University, Southern Polytechnic University, and Bishop College. Notably, Dr. Dixon is the founding chair of the M. S. degree program in physics at Atlanta University (now Clark Atlanta University). Upon graduation from Morehouse College, he began a long relationship with the Woodrow Wilson National Fellowship Foundation. He received a Woodrow Wilson Fellowship to attend Rutgers University. His first academic appointment was as a Woodrow Wilson Teaching Intern at Hampton Institute (now Hampton University). During his career he



## Member Biographies

has contributed as a consultant to several programs sponsored by the Foundation. After some years in academe, he served as a director with an engineering firm. He developed and managed research projects supported by contract with the Department of Energy on nuclear waste disposal.

Throughout his career he has remained active in teaching and research, teaching at undergraduate and graduate levels. He has taught and mentored many students who have obtained the doctorate in physics or engineering. More than fifty of his former students have obtained advanced degrees in engineering, mathematics, or physics. He has maintained an active interest in research in applied mathematics. He is the author of several books and laboratory manuals in physics and articles on many-body scattering theory. He has served as a consultant to many public-school systems and universities on a wide variety of topics, such as diversity, improving the teaching and learning of science and mathematics, the preparation of mathematics teachers, expanding opportunities and increasing diversity in engineering, and improving retention. He is a member of the American Physical Society, the American Association of Physics Teachers, the American Association for the Advancement of Science, and the Mathematical Association of America.



**Ms. Sabrina Ellis**

*Vice President and Chief Human Resources Officer  
New York University*

Sabrina Ellis serves as Vice President, Chief Human Resources Officer for New York University, the largest private university in the United States serving 40,000 students with 18 schools and colleges at five major centers in Manhattan and in sites as diverse as Africa, Asia, Europe, the Middle East and South America.

As the global head of human resources, Sabrina is responsible for Global Compensation, Global Benefits, Employee and Labor Relations, Employee Learning, Talent Acquisition and a host of other programs and services that are fundamental to attracting and retaining more than 26,000 employees globally. With a focus on service quality and operational excellence, under Sabrina's leadership the HR function at NYU continues to advance in meeting the challenges of operating a growing research and teaching enterprise in a global landscape. An important aspect of Sabrina's role is serving as a credible organizational advocate in advancing initiatives that drive improved employee outcomes while also improving results.

Sabrina has served on several boards across a diverse group of organizations and non-profits.

Prior to joining NYU in 2016, Sabrina served in various senior-level HR roles among the nation's largest higher educational institutions including Vice President and CHRO at George Washington University, and Assistant Vice President of Human Resources at the City College of New York of the City University of New York. Sabrina earned her Bachelor of Science degree in Information Systems and Master of Science degree in HR Management from New York University.



**Mr. Adam Goldberg**

*Director and Executive Architect  
U.S. Department of the Treasury  
Office of Financial Innovation and Transformation*

Adam Goldberg is the Executive Architect at the Office of Financial Innovation and Transformation (FIT) at the Treasury Department's Bureau of the Fiscal Service. Within FIT, Adam supports financial management transformation initiatives that lead to government-wide efficiencies. He also serves as a Treasury Advisor to the Minister of Economy and Finance in the Republic of Guinea where he supports the Minister's efforts to improve cash management. Adam joined Treasury after spending six years at the Office of Management and



## Member Biographies

Budget (OMB) as the Chief of the Financial Analysis and Systems Branch where he was responsible for policy development and oversight to implement financial systems, reduce improper payments, and right-size real property. Prior to OMB, he held senior leadership positions at Unisys and Andersen supporting financial management and system improvement efforts at Federal agencies. Adam began his career at the Defense Logistics Agency. Adam holds a BA in Political Science and History from the University of Rochester and an MPA from the Maxwell School of Citizenship and Public Affairs at Syracuse University.

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**Mr. Larry Koskinen**  
*Retired Federal Executive*  
*Consultant on Enterprise Risk Management*

Larry Koskinen has served the public interest for more than forty-five years through executive positions in the federal government, commercial professional services firms, and non-profit organizations—both within the United States and abroad.

He is a retired member of the Federal Senior Executive Service most recently serving as Chief Risk Officer at the United States Department of Housing and Urban Development, where he led HUD's departmental enterprise and fraud risk management programs. During his tenure HUD earned a positive reputation for innovative approaches to the use of advanced data analytics and computational linguistics to identify, understand and remediate program and administrative control weaknesses.

He recently led the Business Transformation Team for NewCore, HUD's administrative shared services partnership with the Treasury Administrative Resource Center, and, at the invitation of the United States Office of Management and Budget, led the project team that drafted the government-wide playbook for federal shared services adoption. Prior to joining HUD, he served as an executive in the federal Inspector General community, managing data analytics, finance, human capital, information technology, strategic planning and support operations at the Treasury Inspector General for Tax Administration and the U.S. Postal Service Office of Inspector General. He has been involved in multiple federal-level government reform efforts, notably the Reagan-era Grace Commission, and the Clinton-era National Performance Review.

Koskinen was a Vice President at the non-profit Council for Excellence in Government (programs of which are now absorbed into the non-profit Partnership for Public Service), and a Vice President at the international development consultancy Development Alternatives, Inc. Prior to that he was Director of Administration and Finance at the non-profit Regional Environmental Center for Central and Eastern Europe in Budapest. He was Management Officer for Peace Corps International Operations and also Chief Business Architect. He served as a Peace Corps Volunteer in the Philippines.

He holds a Bachelor of Science in photography from the Rochester Institute of Technology, and a Juris Doctorate from American University's Washington College of Law.

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**Mr. Robert J. Lavigna**  
*Director*  
*Institute for Public Sector Employee Engagement*

Bob Lavigna has more than 30 years of experience leading government organizations and programs. He is the Director of the *Institute for Public Sector Employee Engagement*, a division of CPS HR Consulting, an independent and self-supporting government agency. The *Institute* helps public-sector and nonprofit organizations measure and improve employee engagement as a key to improving performance and service delivery.

## Member Biographies

Bob's book, *Engaging Government Employees: Motivate and Inspire Your People to Achieve Superior Performance* (American Management Association), is the first book to focus exclusively on employee engagement in the public sector.

Before joining CPS, Bob served as Assistant Vice Chancellor and Director of HR for the University of Wisconsin. He was also an adjunct Associate Professor in the La Follette School of Public Affairs at Wisconsin.

Bob was also Vice President - Research for the Partnership for Public Service, a nonpartisan nonprofit dedicated to revitalizing the public service by inspiring new generations to serve and helping to transform government. He directed research projects, including "Best Places to Work in the Federal Government," that found new ways for government to attract, develop and retain talent.

Bob also previously served as Director of the state of Wisconsin merit system. He began his career with the U.S. Government Accountability Office (GAO) as an auditor, program evaluator, HR Director of GAO's largest field office, and Assistant to the Assistant Comptroller General.

Bob is an elected Fellow of the National Academy of Public Administration and was selected as a "Public Official of the Year" by *Governing* magazine. The organizations Bob has led also received innovation awards from the Ford Foundation, Society for Human Resource Management, Council of State Governments, International Public Management Association for HR (IPMA-HR), Urban League, and others.

He is a past president of IPMA-HR and is also a past national chair of the American Society for Public Administration Section on Personnel and Labor Relations. In addition to his book, Bob writes frequently for professional publications and has authored three book chapters on HR. He has spoken across the U.S. and in Canada, Europe, Asia, South America, the Caribbean, Africa, and the Middle East.

He has a B.A. in Public Affairs from George Washington University, an M.S. in HR from Cornell University and has done Ph.D. work at the University of Wisconsin.



**Ms. Rachel E. Levinson**  
*Executive Director, National Research Initiatives*  
*Arizona State University*

A twenty five-year veteran of science policy at the national level, Rachel Levinson is the Executive Director of National Research Initiatives for Arizona State University, operating in the university's Washington, D.C. office. She came to ASU in 2005 as the director of the Government and Industry Liaison

Office for the Biodesign Institute at Arizona State University. Levinson heads an office responsible for developing policies and strategies that advance the University's research agenda.

Prior to coming to ASU, Levinson was with the Office of Science and Technology Policy in the Executive Office of the President of the United States, where she was the assistant director for life sciences, while on detail from the Office of the Director of the National Institutes of Health. In this capacity, she identified science and technology priorities, developed and advocated Administration objectives, and resolved policy issues in life sciences focusing on laboratory biosecurity, bioterrorism preparedness, biotechnology, biomedical research and technology development and transfer.

Levinson began her career as a biologist for the National Cancer Institute within the National Institutes of Health (NIH) and later moved into the policy arena. She advanced to positions at NIH including deputy director of the NIH Office of Recombinant DNA and senior policy advisor in the Office of Technology Transfer.

## Member Biographies

Levinson earned her B.S in Zoology from the University of Maryland at College Park, and her M.A in Science, Technology and Public Policy from George Washington University, School of Public and International Affairs.

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**Mr. David Mayo**  
*Senior Director for Research Administration*  
*California Institute of Technology*

David Mayo is the Senior Director for Research Administration at the California Institute of Technology. In this capacity he is responsible for pre-award and post-award non-financial services supporting \$422M in research awards annually. David is directly responsible for review and interpretation of existing and emerging government policies and regulations, development of institutional policies and procedures, and development and implementation of training programs for campus staff in the area of research administration. Prior to his appointment at Caltech in 2002, David led the pre-award office at the University of California, Santa Barbara, where he worked in research administration in various capacities since 1981.

David has been a member of his professional association, the National Council of University Research Administrators (NCURA) since 1988. David served as NCURA President in 2008, received its *Distinguished Service Award* in 2009, and received NCURA's highest honor in 2012, the *Outstanding Achievement in Research Administration Award*. David has served on numerous NCURA working groups and committees. He is a content creator for NCURA's on-line and in-person training programs, as well as a frequent presenter at its national and regional conferences on topics such as: federal and industry contracting, regulatory compliance, subcontracting, subrecipient monitoring and award management. David currently participates in the Federal Demonstration Partnership and is a member of its Subawards and Contracts Subcommittees. David also participates in the Council on Governmental Relations as a member of its COVID-19 Federal Award Impact Workgroup.

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**Dr. Joseph P. Mitchell, III**  
*Director of Strategic Initiatives*  
*National Academy of Public Administration*

Joe Mitchell is Director of Strategic Initiatives at the National Academy of Public Administration—an independent, nonpartisan, and nonprofit organization chartered by the U.S. Congress to improve government performance. In this role, Dr. Mitchell leads the organization's Grand Challenges in Public Administration program, which is identifying and developing ways to address the most challenging issues facing government today. He also advances cutting edge thought leadership and develops partnerships with other good government groups, American universities, and universities in other countries.

Over the course of his career, he has worked with a wide range of federal cabinet departments and agencies to develop higher-performing organizations, implement organizational change, and strengthen human capital and teams. Most recently, he was at the General Services Administration to stand up its new Office of Shared Solutions and Performance Improvement within the Office of Government-wide Policy. As an Associate Director of this new office, he built and led a team to manage multi-functional and cross-agency projects and initiatives in support of the President's Management Agenda. His team established governance and accountability mechanisms for federal Cross-Agency Priority Goals, revamped performance.gov to become more user-friendly and provide additional information to the public, upgraded, and expanded the White House Leadership Development Program and CXO Fellows program,

## Member Biographies

provided technical and management support to the federal executive management councils and established a procurement vehicle that federal agencies can use to acquire commercial software-as-a-service capabilities for their payroll and work schedule/leave management.

Previously, Dr. Mitchell led and managed the National Academy of Public Administration's organizational studies program, overseeing all of its congressionally-directed and agency-requested reviews and consulting engagements. He has served as project director for studies of the Government Publishing Office, the U.S. Senate Sergeant at Arms, the U.S. Agency for International Development, the National Park Service's Natural Resource Stewardship and Science Directorate, and the Natural Resources Conservation Service at the U.S. Department of Agriculture.

He holds a Ph.D. from the Virginia Polytechnic Institute and State University, a Master of International Public Policy from the Johns Hopkins University School of Advanced International Studies, a Master of Public Administration from the University of North Carolina at Charlotte, and a B.A. in History from the University of North Carolina at Wilmington. He is a member of Phi Kappa Phi, the national academic honor society; Pi Alpha Alpha, the national honor society for public affairs and administration; and the American Society for Public Administration.



**Ms. Kim Moreland**  
*Associate Vice Chancellor, Director  
Research and Sponsored Programs  
University of Wisconsin - Madison*

Kim Moreland is the Associate Vice Chancellor for Research and Sponsored Programs at the University of Wisconsin - Madison. She has an MBA from the University of Kansas.

Kim has served on the Board of Directors of the Council on Governmental Relations and chaired the Costing Policies Committee. She is on the Board of the Federal Demonstration Partnership and serves as chair of the Finance Committee. She is a lecturer for Johns Hopkins University in the Master's degree program in Research Administration.

Kim has served as a member of the National Council of University Research Administrators (NCURA) national and international teaching faculty and the national peer review faculty. She is a recipient of NCURA's national Award for Distinguished Service in Research Administration and the Award for Outstanding Achievement in Research Administration. She is a former president of NCURA.



**Dr. Robert Nobles**  
*Vice President for Research Administration  
Emory University*

Dr. Robert Nobles (DrPH, MPH) serves as the Vice President for Research Administration at Emory University. Within Emory Nobles leads the research administrative and compliance departments including Clinical Research, Environmental Health and Safety, Institutional Animal Care and Use Committee, Institutional Review Board, Research Administration – IT, Research Administration Services, Research Compliance and Regulatory Affairs, Research Grants and Contracts, Sponsored Programs, Strategic Operations and Training and Technology Transfer with more than 450 team members providing outstanding services that catalyze research and operational excellence. Daily, Nobles and team are responsible for providing the foundation for the research growth that Emory continues to experience while pursuing discovery. As an example of scope, in fiscal year 2020, Emory received nearly \$895

## Member Biographies

million in total research funding awards. Of the overall total, \$598.9 million came from federal research funding awards, led by the National Institutes of Health with \$526.2 million. Emory researchers submitted 4,750 proposals to sponsors totaling \$1.487 billion in 2021.

As the Vice President for Research Administration, Nobles promotes Emory's research growth through oversight and execution of a strategic direction and effective operations for research across Emory. Nobles works in tandem with senior leaders and faculty to ensure proactive, user-focused customer service; effective, metric-driven processes; and transparent communication, to further new and on-going research initiatives that comply with all regulatory requirements. Nobles also fosters the scholarly work of faculty, facilitates multidisciplinary initiatives, supports innovative technology-transfer and commercialization programs, and strives to increase funding support from all sources, while nurturing positive external relationships.

Nationally, Nobles serves as the Vice Chairperson on Board of Directors for Public Responsibility for Medicine & Research (PRIM&R), the Executive Committee for the Federal Demonstration Partnership (FDP), and a member of the National Science Foundation's (NSF) Advisory Committee for Business and Operations (Committee).

Prior to joining Emory University, Nobles served as the interim Vice Chancellor for Research and Associate Vice Chancellor for Research at the University of Tennessee, Knoxville, (UTK) with a faculty appointment in the Department of Public Health within the College of Education, Health, & Human Sciences. While at UTK, Nobles led efforts and oversaw research growth and compliance activities related to a UTK's quest to become a top 25 public research institution. Nobles also served as a sub-investigator on more than 10 community-based research projects focusing on adolescent health, and chaired national and local committees focusing on enhancing research culture. Before UTK, Nobles served as the research compliance officer and public health faculty member at both Texas A&M University and the University of Texas Health Science Center in Houston. In the public sector, Nobles served as a public health prevention specialist for the Centers for Disease Control and Prevention (CDC) and as a program manager for the state of Florida's Department of Public Health.

Nobles completed his Doctor of Public Health at the University of Texas Health Science Center in Houston with a triple major that included health policy & management, epidemiology, and health economics; and he received his master's in Public Health specializing in epidemiology, and a bachelor's degree in molecular biology from Florida A&M University. Nobles is an avid educator and has taught on the collegiate level since 2001 in the areas of environmental biology, anatomy and physiology, public administration, health policy and management, health care finance, ethics, epidemiology, and responsible conduct of research.



**Ms. Karin O'Leary**

*Associate Partner, IBM Consulting  
Fellow, IBM Center for The Business of Government*

Karin O'Leary leads IBM Consulting's business portfolio for the U.S Department of Justice (DOJ) and the U.S. Courts. She is responsible for proposing and overseeing service contracts, which includes business development, driving account strategy, business partner relationships, and customer satisfaction. Karin is also an experienced federal Chief Financial Officer skilled in budget and appropriations, financial management, policy analysis, and enterprise risk management. Karin has extensive experience in managing complex organizational change in federal agencies, with over 25 years of government service. As a fellow with the IBM Center for The Business of Government, she serves as IBM's federal shared services lead and represents IBM with the Shared Services Leadership Coalition and ACT-IAC.



## Member Biographies

Before joining IBM in June 2018, Karin was a career executive in both the Judicial and Executive branches of the U.S. Federal Government. She was the Chief Financial Officer of the Judicial Branch, where she led the implementation of a single financial and procurement system to over 450 court locations in 3 years and transitioned local disbursing to the U.S. Treasury. Before that, Karin was the Budget Director and Deputy Performance Improvement Officer for the U.S. Department of Justice for nearly a decade, with responsibility for developing, promoting, and executing a budget exceeding \$30 billion per year, as well as departmental strategic planning, and performance management. Karin also held senior positions at the Drug Enforcement Administration, and the Court Services and Offender Supervision Agency for the District of Columbia, which she helped to establish. She began her federal public service career at the Corporation for National and Community Service and, prior to that, worked at the local level for the Lackawanna County Government in Pennsylvania.



### **Dr. Theresa A. Pardo**

*Associate Vice President for Research  
Special Assistant to the President  
University at Albany, State University of New York*

Theresa A. Pardo, Ph.D. serves as Associate Vice President for Research and Special Assistant to the President at the University at Albany, State University of New York. She also serves as a Senior Fellow at the Center for Technology in Government (CTG UAlbany), a Full Research Professor in Public Administration and Policy, Rockefeller College and an Affiliate Faculty in Information Science, College of Emergency Preparedness, Homeland Security and Cybersecurity. As Associate Vice President for Research, Dr. Pardo is responsible for the University's research institutes, centers and laboratories and research data governance, among other strategic priorities of the University. As Special Assistant to the President, Dr. Pardo is leading the creation and operation of a novel, interdisciplinary research and collaboration network focused on the achievement of social and health equity.

Dr. Pardo is a Fellow of the National Academy of Public Administration and a past president of the Digital Government Society. She is a founding member of the Global Smart Cities, Smart Government Research Practice Consortium, served as the Chair of Oman's Excellence in E-Government Award Jury in 2015 (first female chair) and 2020, and is an advisor to the E-Government Committee for the China Information Association. Dr. Pardo served as Chair of the Environmental Protection Agency's National Advisory Committee and is a member of the Business and Operations Advisory Committee of the National Science Foundation.

Dr. Pardo served as OpenNY Adviser to New York State's Governor Andrew Cuomo, a member of the User Working Group of the NASA Socioeconomic Data and Applications Center (SEDAC), the Steering Committee of the U.S. National Science Foundation funded North East Big Data Innovation Hub and on numerous UN Expert Groups on a range of digital government and sustainable development related topics. She is a member of the Steering Committee for the International Conference on Theory and Practice of Electronic Governance (ICEGOV) organized by the United Nations University – Portugal, and serves on a number of editorial boards for journals in the fields of digital government and public administration including *Government Information Quarterly* and *Public Management Review*. Dr. Pardo is co-developer of the top ranked academic program in *Information Technology Management* offered by the University at Albany and is ranked among the top scholars in her field in terms citations to her published work.

In 2018 and 2019, Dr. Pardo was named a Top 100 Influencer in Digital Government globally. She is a 2015 recipient of *Government Technology Magazine's* Top 25 Doers, Drivers, and Dreamers Award which recognizes individuals throughout the U.S. who exemplify transformative use of technology to improve the way government does business and serves its citizens. Dr Pardo is a recipient of the Digital



## Member Biographies

Government Society's Distinguished Service Award, the University at Albany's Distinguished Alumni Award, the University at Albany's Excellence in Teaching Award, and the Rockefeller College Distinguished Service Award. She holds a doctorate in Information Science from the University at Albany, SUNY.

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**Dr. Gregory Parham**  
*Senior Advisor*  
*U.S. Department of Agriculture*

Dr. Gregory Parham was employed by the United States Department of Agriculture (USDA) for more than 35 years and retired in 2017, after serving as an Assistant Secretary of Agriculture in the Obama administration. During his career, he was the recipient of Presidential Rank Awards for Distinguished and Meritorious Service.

He subsequently completed the Advanced Leadership Initiative Fellowship at Harvard University. Recently, he returned to Federal service as a Senior Advisor at USDA.

Trained as a veterinarian, he began his Federal government career in the U. S. Public Health Service as a Commissioned Corps Officer at the Center for Disease Control in Atlanta, GA. After joining USDA in 1982 he worked for several agencies and became a career member of the Senior Executive Service, serving as the Administrator of the Animal and Plant Health Inspection Service. Dr. Parham is board certified in veterinary preventive medicine and holds a degree in administrative science from the Johns Hopkins University, as well as, degrees in veterinary medicine and microbiology from the Ohio State University.

Dr. Parham has two grown sons and one grandson and resides with his wife of 43 years in Mitchellville, MD.

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**Mr. Bill Valdez**  
*President*  
*Global Innovation Associates, LLC.*

Bill Valdez is a recognized science and technology thought leader who has successfully led science and technology programs in the Federal government and made significant contributions to the effectiveness of government programs to deliver improved mission value to American taxpayers.

Bill retired from the Federal government in 2014 and became an adjunct faculty at American University's Key Leadership Program and began consulting with public and private sector organizations to provide strategic advice on a wide-ranging set of issues, including science policy and government modernization/improvement.

Most recently, Bill was the President of the Senior Executives Association (SEA), where he focused on strengthening the Senior Executive Service (SES) through legislative and policy initiatives, building a leadership pipeline for the Executive Branch, working with a broad range of good government groups to modernize the civil service, and restoring a public service ethic to the Federal government.

Bill was a co-editor/author of the *Handbook of Federal Government Leadership and Administration: Transforming, Performing, and Innovating in a Complex World*, and was an author of the IBM Center for the Business of Government's recent report, *Preparing the Next Generation of Federal Leaders: Agency-Based Leadership Development Programs*.

His career with the Department of Energy spanned over 20 years and he held the positions of Director, DOE Office of Economic Impact; DOE's Chief Diversity Officer; Director of Business Services, Office of Energy Efficiency and Renewable Energy; and Director of Planning and Analysis, and Director for

## Member Biographies

Workforce Development within DOE's Office of Science. During this time, Bill became expert in both programmatic and policy development, along with the operational side of the house including HR, procurement and IT.

From 2005-2014 Bill was the Co-Chair of the Science of Science Policy Interagency Working Group. This IWG sparked a government-wide effort to understand the impact of Federal government S&T programs and to develop tools, data and analytical techniques that are in common use at Federal science agencies today. Agencies are also using those tools and data to provide Congress with better budget proposal analyses and to inform taxpayers about the important benefits S&T programs bring to our Nation.

In addition, Bill was a senior advisor at the White House Office of Science and Technology Policy (OSTP) in the 1990s. Bill was awarded the Presidential Rank Award (meritorious) in 2007 and was elected as a Fellow of the American Association for the Advancement of Science (AAAS) in 2006.

Prior to working at DOE, Bill worked as a Senior Project Manager in private industry where he provided strategic planning services to Asian and European multinational corporations. He also was a reporter in Austin, Texas.

Bill received a Bachelor of Arts from the University of Texas and his Master of Arts in International Economics and Energy Policy from the Johns Hopkins School of Advanced International Studies.



**Ms. Pamela A. Webb**  
*Associate Vice President for Research*  
*University of Minnesota*

Pamela A. Webb is the Associate Vice President for Research at the University of Minnesota. In this capacity, she is responsible for pre-award and post-award non-financial services supporting about \$876M in research awards annually, as well as negotiation of F&A rates, effort reporting, and research policy and education. Prior to her appointment at the University of Minnesota in 2007, Pamela led pre-award and post-award administration in the Office of Sponsored Research at Stanford University. Pamela has been involved in research administration for 37 years, including 12 years at the University of California-Los Angeles as well as UC Santa Barbara, Northwestern University, and Stanford.

Pamela has served as a national officer of her professional association (the National Council of University Research Administrators, NCURA) and served two terms on NCURA's Board of Directors. In 2009, she received NCURA's *Distinguished Service* award, and in 2016, she received NCURA's highest honor, the *Outstanding Achievement in Research Administration Award*.

She has recently completed her term as Chair of the Council of Governmental Relations (COGR) Board of Directors and continues to serve on their Research Compliance and Administration Committee. She has co-chaired a national conference on Electronic Research Administration; serves as a reviewer for NCURA's Peer Review program; and as faculty for their national Leadership Workshop. Pamela previously served on the Federal Demonstration Partnership Executive Committee and currently co-chairs their Foreign Influence Working Group. Pamela is a frequent presenter at the national and regional level, specializing in subawards, policy development and deployment, as well as helping research administrators learn the complex regulatory environment.



**Ms. Maureen E. Wylie**  
*Federal Chief Financial Officer (Retired)*

Maureen Wylie currently serves on the Board of Directors for SquashWise, which focuses on academics, athletics, and opportunity for Baltimore's youth, as a part of the Squash and Education Alliance. She is also a member of the Partnership for Public Service Senior Advisors to Government Executives (SAGE) program.

Ms. Wylie served as Chief Financial Officer of the U.S. Nuclear Regulatory Commission from July 2014 to December 2019, when she retired and ended her nearly 35-year career in the federal government. She was responsible for all budgeting and financial management for the agency, as well as a critical leader for its Project Aim and Transformation efforts.

While at NRC, Ms. Wylie spear headed efforts to create authoritative data not just for financial management, but also for nuclear reactor and materials program management. She conducted multi-year business process change initiatives that transformed how the agency charged fees to licensees and made the application of data analytics possible. As a member of the government-wide Chief Financial Officers' Council, Ms. Wylie served as its representative on the Technology Business Management Executive Steering Committee (ESC), leading the first full adoption of information technology cost transparency in support of that Cross-Agency Priority (CAP) goal. She was also integral to the Financial Data Transformation (ESC), bringing together the Council's data and information efforts associated with several CAP goals and with efforts to improve transparency in budgeting, financial management, and performance goals.

She previously served as the Chief, Resource and Operations Management for the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce from January 2012 through July 2014. She was the principal executive for all matters related to the NOAA's Corporate Services. Prior to that assignment, she also served as NOAA's Chief Financial Officer from 2004. During that period, she led financial management and budgeting for the largest bureau of the Commerce Department as it responded to increasing mission demands in its critical weather, satellites, and fisheries regulatory functions.

Ms. Wylie also served as the G8, Resources Army National Guard (ARNG), responsible for resource management for the Army National Guard from October 2001, capping nearly twenty years as a Department of the Army civilian in a variety of resource management, base realignment and closure, and facilities management roles. Special assignments during this period included stints at HQ, US European Command J-5, the Congressional Research Service, and the House Armed Services Committee Staff.

A recipient of many awards while with the Army, including the Pace Award for leadership in 1994, she received a Distinguished Executive Presidential Rank Award in 2009 and the NOAA Administrator's award in 2011. Ms. Wylie is the recipient of the Association of Government Accountants 2020 Elmer Staats Award, which recognizes a federal leader who exemplifies excellence in government financial management, outstanding leadership, high ethical standards, and innovative management.

She began government service in 1985 as an Army Presidential Management Intern. Ms. Wylie graduated with honors from Rutgers University with a BA in Political Science in 1982, from Yale University with an MA in International Relations in 1984; and was a 1999 Distinguished Graduate of the Industrial College of the Armed Forces, with an MS in National Resource Strategy. She is also a member of the 1997 class of the Defense Leadership and Management Program and a 2003 graduate of the Federal Executive Institute.

## Subcommittee on NSF's Information Technology and Enterprise Architecture Strategy Recommendations Report — January 21, 2022

### Introduction

The Subcommittee has been charged with reviewing NSF's IT Strategy and related Architecture and providing a bulleted list of informed recommendations for changes in process, direction, and/or potential investment in new and emerging technologies for possible implementation in the next budget year. The committee has completed the review.

The recommendations below do not refer to any specific NSF IT strategy document area. However, a high-level view of the IT strategy process is given below to understand the Subcommittee's recommendations better. NSF's IT mission and vision align with NSF's Strategic Goal 3 to Enhance NSF's performance of its mission. Goal 3 is broken down into two Strategic Objectives, (3.1) Human Capital—Attracting, retaining, and empowering a talented and diverse workforce, and (3.2) Processes and Operations—Continually improve agency operations. NSF's IT vision is to provide cutting-edge IT solutions to enable the Foundation to remain agile and thrive in an ever-evolving landscape. NSF's IT mission is to provide the highest quality technology-based services and solutions most cost-effectively to facilitate the Foundation's mission.

The CIO oversees policy and governance to use IT resources to accomplish the Foundation's mission efficiently. The Division of Information Systems (DIS) provides the hardware, software, support systems, and services staff needed to work on behalf of the Foundation, including managing the agency's grant-making process and advanced financial systems. NSF has created an agile and democratized continuous improvement process for IT investments, a Target Technical Architecture (TTA), and a plan for technology investments for FY21 - FY23 to fulfill its IT mission as described above.

In general, NSF is heading in the right direction with emerging technologies with the use of Shared Services, leveraging Data as a Strategic Asset, Multi-Cloud, Empowering Workforce with Digital Technologies, investing in multiple new technologies including AI/ML, Low Code/No Code, DLT, RPA, and Zero Trust. The following recommendations augment NSF's current IT and emerging technology plans to accelerate innovation and achieve the desired "Speed and Scale." The Subcommittee recommends **aligning technical activities** and **organizational capability** with **strategic goals** (recommendations 1 and 2), **accelerating innovation** (recommendation 3), and forming **effective partnerships** (recommendation 4).

### Recommendations

**1. Establish linkage of technology actions and business objectives and demonstrate that the FY21-FY23 technical investments will incrementally and continuously improve the quality, performance, and scalability of IT solutions cost-effectively while meeting strategic objectives.**

1.1 Explain the cohesiveness among the eight "IT portfolios" and make NSF's IT Strategy more understandable, especially by non-IT experts, e.g., mission and budget people.

1.2 Break down Technology Investments with specific operational pain points and expected improvements. For each project, specify target performance metric(s), expected improvement from technology and resource investment. Use state-of-the-art project management and risk assessment tools to measure operational effectiveness and maximize responsiveness to customer needs.

1.3 Develop a strategy that includes using natural language processing technologies to continuously assess internal and external customer and developer experience with IT tools, solutions, and services. Gain actionable strategic insight on IT investments. Include deputy assistant directors, office heads, information systems division (including all IT staff and developers, personnel responsible for the grant-making process, and advanced financial systems).

**2. Given the direction stated in the strategic plan, review the current IT operational structures for leadership, governance, delivery, operations and oversight to identify opportunities for streamlining of processes or realignment of responsibilities in order to improve overall visibility, effectiveness and close linkage of organizational capability with business objectives.**

2.1 Confirm that the accountability for delivery, oversight and budget decisions are balanced and aligned for informed, efficient decision making.

2.2 Define specific actions to ensure alignment between goals established by senior leadership and democratized idea submission process. Include any needed communication actions.

2.3 Since the individual responsible for strategic IT direction, NSF's CIO and the individuals responsible for the implementation of technical capabilities and day to day operations are in different parts of the organization, ensure that processes defined support maintaining alignment between strategic goals and project and operational activities.

2.4 Identify approaches (e.g., partnerships) that may be leveraged to expand NSF resource and operational capacity in support of agility for resiliency or significant additional demand.

**3. Develop and implement a data centric process that oversees quantifiable results-oriented projects with accountable IT innovations and operations resources to achieve "Speed and Scale".**

3.1 Form a "Technology Innovation" team with the responsibility of evaluating the applicability and viability of emerging technology for the goals of NSF. Given the spectrum of emerging technology NSF plans to undertake, their varying levels of maturity, and the uniqueness of NSF organization, it is imperative that a dedicated team under the leadership of the CIO is charged with technology evaluation and is responsible for customizing and approving their operational IT implementation.

3.2 Additional recommended responsibilities for "Technology Innovation" team:

3.2.1 Bring "data fabric" to the forefront in all central IT implementations to ensure the IT staff in Investment Owners and Working Groups are able to utilize a wide variety of raw data sources, enriched using common patterns for ease of use in low-code/no-code platforms. Specific goals of data fabric are: identify and fill data gaps, automate contextualization, preparation and enrichment of data at the point of ingestion to expedite AI/ML deliveries. This contributes directly to "Speed and Scale".

3.2.2 Evangelize technology initiatives across NSF's vast network of universities and partner institutions with efforts such as providing guidance, reference architectures, blueprint solutions, mentorship etc. This is critical considering the success of "Speed and Scale" at NSF is intertwined with that of its vast network of universities and partner institutions. Please refer to recommendation #4.3 for additional responsibility of "Technology Innovation" team.

**4. Provide leadership in the creation, growth, and support of external partnerships, and communities of those partners, that increases the impact from the partners' joint strategic outcomes, especially by streamlining deployment of technology from these partnerships.**

4.1 Share and support best practices and establish technology deployment networks to accelerate the transition of NSF-funded research results to the U.S. commercial markets. For certain types of research, it may be possible to include an assessment of deployment value within the review process.

4.2 Expand the creation and use of scientific data, especially through new models for curating derivative datasets from fundamental research activities, to make publicly funded data broadly available. Data is a new “currency” in US competitiveness. NSF has an opportunity to establish leadership of derivative dataset use through demonstrating their value and encouraging university research partners to explore their deployment.

4.3 Collaborate with partners to develop secure, cross-institute IT platforms to meet the requirements of growing and increasingly diverse partnerships and communities. Such a two-way collaboration can result in modern technology at both NSF and its partner institutions. This effort can be particularly valuable in meeting the needs for secure data and information access. For example, moving from authentication by a “home” environment to a focus on the user’s individual identity using next-generation secure access, trust, and user validation systems and protocols will be critical. In this effort, NSF may provide guidance, reference architectures, and/or blueprint solutions as part of such a mentorship initiative.





# BOAC MEETING

Subcommittee on NSF's Information  
Technology and Enterprise Architecture  
Strategy

January 21, 2022



## **Subcommittee on NSF's Information Technology and Enterprise Architecture Strategy**

**Charge:** Prepare a bulleted list of recommendations regarding the direction of IT at NSF, and/or suggestions for leading-edge technologies on the horizon for potential implementation in the next budget year.

### **Agenda and Subcommittee (5 mins per topic)**

- **Introduction:** Tilak Agerwala; Vice President IBM (Retired), Subcommittee Chair, BOAC Liaison
  - **R1: Aligning Technical Activities with Strategic Goals:** Tilak
  - **R2: Aligning Organizational Capabilities with Strategic Goals:** Suzette Kent; CEO Kent Advisory Services; Former Federal CIO for the US
  - **R3: Accelerating Innovation: Data-Centric Processes:** Viji Krishnamurthy; Senior Director, Product Management, Oracle Cloud Infrastructure AI services
  - **R4: Effective Partnerships:** Lee Cheatham; i2i Advisers, Director of Technology Deployment and Outreach, PNNL (Retired)
- **Discussion**



# 1. Establish linkage of technology actions and business objectives and demonstrate that the FY21-FY23 technical investments will incrementally and continuously improve the quality, performance, and scalability of IT solutions.

- 1.1 Explain the cohesiveness among the eight “IT portfolios” and make NSF's IT Strategy more understandable, especially by non-IT experts, e.g., mission and budget people.
- 1.2 Specify expected improvement from technology and resource investment. Use state-of-the-art project management and risk assessment tools to measure operational effectiveness and maximize responsiveness to customer needs.
- 1.3 Develop a strategy that includes using natural language processing technologies to continuously assess internal and external customer and developer experience with IT tools, solutions, and services.

## **2. Review the current IT operational structures for leadership, governance, delivery, operations and oversight to identify opportunities for streamlining of processes or realignment of responsibilities in order to improve overall visibility, effectiveness and close linkage of organizational capability with business objectives.**

- 2.1 Confirm that the accountability for delivery, oversight and budget decisions are balanced and aligned for informed, efficient decision making.
- 2.2 Define specific actions to ensure alignment between goals established by senior leadership and democratized idea submission process. Include any needed communication actions.
- 2.3 Ensure that processes defined support maintaining alignment between strategic goals and project and operational activities.
- 2.4 Identify approaches (e.g., partnerships) that may be leveraged to expand NSF resource and operational capacity in support of agility for resiliency or significant additional demand.



### 3. Develop and implement a data centric process that oversees quantifiable results-oriented projects with accountable IT innovations and operations resources to achieve “Speed and Scale”.

- 3.1 Resource a “Technology Innovation” team in CIO organization with the responsibility of evaluating the applicability and viability of emerging technology for the goals of NSF.
- 3.2 Additional recommended responsibilities for “Technology Innovation” team:
  - 3.2.1 Bring “data fabric” to the forefront in all central IT implementations to ensure the IT staff in Investment Owners and Working Groups can utilize a wide variety of raw data sources, enriched using common patterns for ease of use in low-code/no-code platforms.
  - 3.2.2 To achieve "Speed and Scale" at NSF and across NSF’s vast network of universities and partner institutions, evangelize technology initiatives with efforts such as providing guidance, reference architectures, blueprint solutions, mentorship etc.

## 4. Provide leadership in the creation, growth, and support of external partnerships, and communities of those partners, that increases the impact from the partners' joint strategic outcomes, especially by streamlining deployment of technology from these partnerships.

- 4.1 Share and support best practices and establish technology deployment networks to accelerate the transition of NSF-funded research results to the U.S. commercial markets.
- 4.2 Expand the creation and use of scientific data, especially through new models for curating derivative datasets from fundamental research activities, to make publicly funded data broadly available.
- 4.3 Collaborate with partners to develop secure, cross-institute IT platforms to meet the requirements of growing and increasingly diverse partnerships and communities. NSF may provide guidance, reference architectures, and/or blueprint solutions.