

# Foundations of a Healthy and Vital Research Community for NASA Science

The strength of NASA science lies with its people, those who work directly for the agency and the thousands of U.S. space, Earth, biological, and physical science researchers and professionals who are part of the space research enterprise. Supported by the NASA Science Mission Directorate (SMD) and other sources of funding, this science and research community makes discoveries about our universe, solar system, planets, the sun and stars, and Earth, engaging and informing the world and fueling even more remarkable discovery.

NASA's SMD requested the National Academies of Sciences, Engineering, and Medicine undertake a study to examine the foundation for healthy and vital research communities for NASA science. To that end, the committee identified six attributes that define a healthy and vital research community: clear scientific goals; a workforce illustrating diversity of backgrounds and skills; a science enterprise engaged in outreach to the larger community; adequate funding for advancing the research agenda; capacity to adjust to change; and shared community standards of conduct.

*Foundations of a Healthy and Vital Research Community for NASA Science* makes recommendations to improve the health and vitality of the communities of researchers to aid in accomplishing the NASA research objectives. This document highlights some of the committee's recommendations. The complete report and recommendations can be read or downloaded at <https://nap.nationalacademies.org/catalog/26575>.

## **FOCUS ON CLEAR, RELEVANT SCIENCE**

Clear scientific questions guide research and facilitate communication of the mission, alignment of funded research, and communicate

societal value to a wide range of stakeholders. To ensure a robust research strategy and achieve research priorities, the committee recommends that **SMD should collect key data and trends representative of the research solicitation process and quality of the research produced by the science community.** This will include examining key indicators and efforts such as metrics of participation (center, type of institution, specific institutions, partnership); review of peer-review effectiveness and data sharing of other division-unique initiatives; and a dashboard that tracks the multi-objective nature of driving science while incentivizing and supporting change.

#### **ENABLE AND SUPPORT A HEALTHY AND REPRESENTATIVE WORKFORCE**

NASA's scientific enterprise relies on a healthy and vital workforce that can support world-class space, Earth, and biological and physical sciences missions making innovative scientific discoveries. The desired workforce should reflect the values of diversity, inclusion, equity, and accessibility (DEIA) across a broad range of characteristics. To enable and support the workforce, **the report recommends that SMD fully implement the recommendations from its 2020 study on the Agency Science Workforce.**

To date, NASA has not established the benchmarks or baselines to assess the health and vitality of its research community. The report recommends **SMD should use the demographic data collected through the Office of the Chief Scientist demographic survey to strengthen and evaluate progress in achieving NASA SMD's DEIA goals.**

#### **PURSUE EDUCATION AND OUTREACH**

NASA is one of the nation's leading federal science, technology, engineering, and mathematics (STEM) agencies, and plays a critical role in shaping STEM education and outreach. The National Academies' report *NASA's Science Activation Program: Achievements and Opportunities* (2020) recommended evidence-based strategies and other measures should be used to ensure there is consistency in the data collected by these education and outreach programs.

To further support consistent education and public outreach program evaluations, this report recommends that **SMD should propose to the Office of the Administrator pursuit of an agency-wide strategic approach to education and public outreach that will include consistent definitions of success and impact and appropriate evaluation measures for use across the SMD education and public outreach portfolio as well as the agency as a whole to ensure consistent programmatic data collection.**

#### **PROVIDE KEY ADMINISTRATIVE OVERSIGHT**

While leadership is key to sustaining any initiative, the committee found that SMD currently lacks an official with adequate staff who has the responsibility to assess and shape the health of its research communities.

The report recommends that **SMD should appoint a senior executive (perhaps with a Senior Level rating) with oversight responsibility for the collection and analysis of data used to determine how well SMD is doing in creating a vibrant and healthy science community and the degree to which they are meeting DEIA goals.** This appointed individual would be responsible for ensuring progress is being made across the directorate, benchmarking against other agencies and recommending promising practices for consideration; working in cooperation and collaboration with the other agency offices/departments (Chief Scientist, other directorates, Office of Human Capital Management, Small Business, etc.); and apprising the SMD Associate Administrator and Division Directors regularly of progress being made and barriers to accomplishment of established DEIA goals.

#### **MEASURES TO ASSESS HEALTH AND VITALITY**

Determining the health and vitality of research communities requires more than the collection of raw data. SMD compiles extensive information, but too frequently the data are not linked together, and sometimes the information is presented without context, making it unclear how to advance community health and vitality.

Although many data sources are available to NASA, there are opportunities for improvement. The report recommends **SMD should collect relevant culture and demographic data to obtain a comprehensive understanding of the longitudinal health and vitality of the relevant space and Earth science communities. This effort should include demographic aspects beyond race and gender. NASA SMD should work with social scientists to develop a plan to capture and examine these data regularly while minimizing the potential for survey fatigue.**

The committee also recommends engaging social and behavioral scientists and similar experts in data collection and use. **SMD should define its space and Earth science research community to include not only the principal scientists but also the network of professionals and skilled workers who enable the research, advocates who have public interest in the SMD mission, and potential members such as disciplinary-aligned students and researchers who could submit proposals. SMD's goal should be to understand a broader swath of its community to ensure its overall health and vitality. Sampling of these populations should be considered in the development of survey strategies.**

#### **PROMISING PRACTICES**

SMD has developed multiple practices to address the health of its communities. Although the report assessed these practices against each of the six attributes of health and vitality, many promising practices associated with mentoring merited attention. Mentoring activities have proven effective in broadening the research community and preparing young scientists and engineers. SMD participates in informal mentoring activities to strengthen the skills and expertise of early career professionals but could expand those efforts. The committee recommends **SMD should develop a Mentor-Protégé Program for Minority Serving Institutions, including Historically Black Colleges and Universities, Hispanic Serving Institutions, Tribal Colleges and Universities, Asian American and Pacific Islander Serving Institutions, Alaska Native and Native Hawaiian Institutions, Native American Serving Non-Tribal Institutions, and Predominantly Black Institutions, to help them train and develop principal investigators and researchers.**

This report recognizes the need for continued assessments of changes within SMD. The future of NASA's research is reflected and embodied by its researchers. Their new ideas and energy will contribute to the excitement and discovery in ways yet to be seen.

**COMMITTEE ON THE FOUNDATION FOR ASSESSING THE HEALTH AND VITALITY OF THE NASA SCIENCE MISSION DIRECTORATE'S RESEARCH COMMUNITIES** **CHARLES F. BOLDEN, JR. (NAE)**,<sup>1</sup> The Charles F. Bolden Group, LLC, *Co-Chair*; **WANDA A. SIGUR (NAE)**, Lockheed Martin Corporation (retired), *Co-Chair*; **GALE J. ALLEN**, American Society for Gravitational and Space Research (retired); **ROGER BLANDFORD (NAS)**,<sup>2</sup> Stanford University; **ANTONIO J. BUSALACCHI (NAE)**, University Corporation for Atmospheric Research; **CHRISTOPHER M. KEANE**, American Geosciences Institute; **SHERI KLUG BOONSTRA**, Lucy Student Pipeline and Competency Enabler (L'SPACE) Program; **ROSALY M.C. LOPES**, Jet Propulsion Laboratory; **CORA BAGLEY MARRETT**, University of Wisconsin–Madison; **MARK B. MOLDWIN**, University of Michigan; **KENNETH SEMBACH**, Space Telescope Science Institute; **SUSAN WHITE**, American Institute of Physics

**STAFF** **DWAYNE A. DAY**, Senior Program Officer, *Study Director*; **GAYBRIELLE HOLBERT**, Program Assistant; **COLLEEN N. HARTMAN**, Director, Space Studies Board

<sup>1</sup> Member, National Academy of Engineering.

<sup>2</sup> Member, National Academy of Sciences.

#### FOR MORE INFORMATION

This Report Highlights was prepared by the National Academies' Space Studies Board based on the report *Foundations of a Healthy and Vital Research Community for NASA Science* (2022).

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This Consensus Study Report is available from the National Academies Press (800) 624-6242 | <http://www.nap.edu> | <http://www.nationalacademies.org>

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