

Ms. Sandra Cauffman  
Acting Director, Earth Science Division  
Science Mission Directorate  
NASA Headquarters  
300 E St SW  
Washington, DC 20546

December 1, 2019

Dear Ms. Cauffman,

The Applied Sciences Advisory Committee (ASAC) met by video conference in November 2019. We received excellent briefings and had productive discussions on a variety of subjects related to the Earth Science Division's (ESD) and Applied Sciences Program's (ASP) activities. The ESD and the ASP leadership and staff are to be commended on the coordination and content of the ASAC meetings, which the Committee finds well organized, informative, and transparent regarding both strengths and challenges. The meetings allow us to provide advice through ongoing dialogue and give us confidence in the sound management of ESD and the Applied Sciences Program. Our letter report provides summaries of our deliberations regarding three key topics and our findings and recommendations from these discussions.

## **TOPIC 1: Private / Non-Public Sector Engagement <sup>1</sup>**

**FINDING: ASAC continues to support ESD & ASP engagement with the Private sector** to leverage assets, find mutual benefits, and identify approaches that can increase the societal impact of EO science and technologies. The committee had a rich conversation about many pathways for this engagement, and ASAC agreed that identifying the common elements of these pathways would be the next critical step. An attached appendix provides examples for illustrative purposes (they are not necessarily specific recommended programs to emulate).

- **RECOMMENDATION: ASP should form a Private Sector Ambassador to work in the short to mid-term to establish private-sector engagement.** As an individual or team, the Ambassador can be an established entry point for private sector entities unfamiliar with NASA Earth Science and can help private sector entities to navigate NASA Earth Science. The Ambassador would have experience working with multi-stakeholder initiatives, building institutional partnerships, navigating contracts and data licensing, and the like. The

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<sup>1</sup> For this letter, private sector includes the non-public sector

Ambassador could help to identify and recognize the potential for new partnerships for ESD and ASP, with an aim to help foster increased adoption and usage of NASA resources by the partners. The Ambassador can support private sector entities to engage with NASA Earth scientists to learn about upcoming research. The Ambassador could also help establish feedback channels so NASA staff can hear from the broader community as to how their data, analysis, and research are having an impact. One approach could target a senior person who is not already at NASA but that knows both the organization and technology with a history of working in public-private partnerships would be highly desirable for ASP. Without such a person, dedicated to this task, beyond comms, we expect this conversation will continue to loop as it has for at least a decade.

The World Bank uses a type of ambassador model. The World Bank's Private Sector Liaison Officers Network is designed to facilitate World Bank Group (WBG) communications with the private sector, support companies' contact with the WBG, advise WBG on how to engage companies better, and disseminate WBG knowledge and research of interest to the private sector. Additional information and examples are in Appendix A.

- **RECOMMENDATION:** ASAC recommends that ***ASP should investigate several modes of engagement with the Private (Non-Public) sector.*** In selecting modes and scoping its approaches, ASP should leverage existing private sector engagement documentation (e.g., USAID's [toolkit for private sector engagement](#), Mercy Corps' [private sector engagement strategy](#)), landscape analysis, and individual modalities that include but are not limited to the following (Appendix B provides examples):
  - ***Academic Technology Transfer:*** With the advent of the Bayh-Dole Act of 1980, Universities can commercialize federally funded research. In response, many universities have established Technology Transfer Offices to facilitate university to industry transfers. ASAC recommends that ASP explores potential opportunities with these offices or organizations that coordinate between these offices.
  - ***Accelerators:*** A Business Accelerator is an organization that gives developing companies access to mentorship and other supports that helps them become stable businesses. They are aware of business communities in specific sectors and are inherently brokers and connectors. Accelerator programs usually have modest financial investments and a set timeframe in which individual companies spend from weeks to months working with

mentors to build out their business and avoid problems along the way. Y Combinator, Techstars, and Brandery are some of the most well-known accelerators. ASAC encourages ASP to investigate how they could potentially team up with an accelerator or a group of accelerators to increase potential opportunities. If mutually-beneficial objectives are found, ASP (and ESD more broadly) should pursue them to expand uses of Earth observations and NASA research.

- **Incubators:** A Business Incubator is an organization that is focused on the in-depth development of early-stage companies or individuals forming a company around technologies or services. They are aware of business communities in specific sectors and are inherently brokers and connectors. ASAC encourages ASP to investigate how they could potentially team up with an incubator or a group of incubators to increase potential opportunities. If mutually-beneficial objectives are found, ASP (and ESD more broadly) should pursue them to expand uses of Earth observations and NASA research.
- **Non-Governmental Organizations (NGO):** NGO's offer a wide variety of teaming options that can develop and greatly expand the use of EO science and technologies through their capacity-building efforts, social and environmental justice driven agendas and broad networking reach. ASAC encourages ASP to investigate how they could potentially team up with the NGO community to increase potential opportunities.
- **Foundations:** Foundations are focused on mobilizing financial resources, leveraging networks, and building relationships to achieve the mission of the foundation. ASAC encourages ASP to identify and assess foundations that could benefit from EO science and technologies to further meet its mission.
- **Corporate Structures:** ASAC emphasizes the criticality to understand the structure of both large and small businesses to identify opportunities for targeted engagement. Businesses may be corporations or cooperatives (coop), which differ markedly in principles and corporate culture and purpose. Every effort should be made to ensure America's largest coops are also involved, such as mutual insurers and major food brands, which may have intensive climate-water-energy-geospatial issues, (e.g., Ocean Spray is a coop). The Appendix provides a small, illustrative list of potential opportunity types.

- **Multi-sector consortia.** A variety of institutions have in-place mechanisms for facilitating communication and innovation across public/non-public sector boundaries. Such multi-sectoral efforts can provide a highly efficient point of engagement between ASP and multiple corporate and/or academic actors that could potentially benefit from NASA Earth science data and applications.
- **RECOMMENDATION: ASAC recommends that ESD and the ASP should identify several types of engagement with the Private (Non-Public) sector** that could include but are not limited to front end co-investment, back end co-funded investment, tech transfer of NASA science and technologies, and NASA based mentorship.
- **RECOMMENDATION: ASAC recommends that ESD and ASP articulate specific end-goals, benefits, or needs met by engagement with the private sector.** At the May 2019 ASAC meeting, ASP articulated the key reasons for pursuing engagement with the private sector, and ASAC understands and supports the strategic purpose in the pursuit of the private/non-public sector. In considering the approaches mentioned above and its implementation, ASP should articulate the benefits expected to accrue to specific stakeholders, the associated timelines, milestones, and means to benchmark progress toward success.

## **TOPIC 2: Communications (Technical Content Strategy)**

**FINDING: ASAC is pleased to see that ASP's final Technical Content Strategy incorporates the recommendations and findings from previous ASAC letters.** It is also clear from the presented documentation that ASP's unique communication assets and needs were carefully considered, addressed, and incorporated. ASAC found that the strategy is a sound approach and anticipates its implementation.

- **RECOMMENDATION: ASAC recommends that the ESD fully implements ASP's Technical Content Strategy and provides the time, attention, and resources to advance ESD and ASP communications.** Given that the strategy is implemented in two-year plans with annual updates, a minimum period of 24 months is necessary to assess the initial effectiveness of the new strategy.

## TOPIC 3: Applications Guidebook

**FINDING:** There remains a clear need for ASP to produce a living “Guidebook” for the community to document lessons learned on effective ways to conduct applications, work with users, and manage projects. This would need to be “living” in the sense that the world of applications work is ever-changing, but this guidebook could help to identify some of the key principles and pathways by which applications work is initiated and succeeds in practice.

- **RECOMMENDATION: ASAC recommends that ASPs develop a draft of a Guidebook based on ASP’s needs.** ASAC is enthusiastic to give further input or recommendations on the draft when presented.

On behalf of the ASAC Committee, we are very grateful for the opportunity to provide our advice and recommendations to you and NASA Earth Science, and we are grateful for how NASA has considered prior findings and recommendations seriously. Please contact me if you have any questions about this letter report, and I would be pleased to discuss the findings and recommendations with you.

Sincerely yours,



David Saah

Chair, Applied Science Advisory Committee  
Director of the Geospatial Analysis Lab at the University of San Francisco  
Managing Principal of Spatial Informatics Group

Cc. Lisa Dilling, University of Colorado Boulder  
Molly Jahn, University of Wisconsin-Madison  
Rhiannan Price, Maxar Technologies  
Daniel Sarewitz, Arizona State University  
David Wilkie, Wildlife Conservation Society  
Fuyuen Yip, Centers for Disease Control and Prevention  
Paula Bontempi, NASA HQ  
Lawrence Friedl, NASA HQ  
Peter Meister, NASA HQ  
Emily Sylak-Glassman, NASA HQ

## Appendix A: Private Sector Ambassador

- An ambassador could provide resources and assistance to help navigate these partnerships. For example, USAID produced a [toolkit for private sector engagement](#) for their grantees and partners that might offer helpful guidance on this and their private sector engagement site.
- One area of exploration for a private sector ambassador would be new funding mechanisms to engage a broader set of partners, including start-ups, large corporations, non-government organizations, research institutes, journalists and more.

EXAMPLE: The Copernicus Masters is an international competition that awards prizes to innovative solutions, developments, and ideas for business and society based on Earth observation data.

- There is also an opportunity for ASP to have such an ambassador to help engage the private sector and non-public sector around the Sustainable Development Goals and other key program areas.

EXAMPLE: UK Space Agency's International Partnerships Programme is a five year, £152 million programme run by the UK Space Agency. IPP focuses strongly on using the UK space sector's research and innovation strengths to deliver a sustainable economic or societal benefit to emerging and developing economies around the world. IPP seeks to maximize the practical impact on the lives of those living in developing countries by partnering with developing countries to use space solutions to solve their specific development challenges, and in doing so increase their capacity. As a secondary objective, IPP will contribute to the continued strength of the UK's space sector. The projects within IPP span a whole range of themes; including reducing deforestation, disaster response, land-use monitoring, reducing maritime problems and deploying renewable energy.

## Appendix B: Modes of Engagement with the Private Sector

### ***Academic Technology Transfer***

EXAMPLE: [AUTM](#) (formerly Association of University Technology Managers). More than 800 universities belong to AUTM, making it a potentially valuable node for ASP to engage not only with the most entrepreneurial parts of the academic enterprise but also with the academic-industry partnerships that are seeking to move ideas quickly from the university setting to commercialization.

EXAMPLE: [DxHub](#) - A partnership between Cal Poly and Amazon Web Services that apply Amazon's human-centered, 'Working Backwards' innovation methodology to tackle challenges facing government, education, and non-profit organizations. The DxHub team leads public sector organizations through innovation and solution workshops structured to generate big ideas and impactful solutions. Through product development sprints and customer validation testing, the team creates a 'lean prototype' that brings the solution to life. Students assist the team throughout the innovation process and can serve as a template where NASA supplies EO, science, and mentorship to the program.

### ***Accelerators***

EXAMPLE: [Techstars Starburst Space Accelerator](#). The Techstars accelerator built the Starburst Space Accelerator consortium of partners that include the Jet Propulsion Laboratory, U.S. Air Force, Lockheed Martin, Maxar Technologies, SAIC, and Israel Aerospace Industries North America, focused on the next generation of space technology companies and related frontier technologies. The Starburst Space program is NASA's first aerospace accelerator program that selected ten startup companies to take part in a three-month pilot program to develop new technologies for space.

EXAMPLE: [Air Force Space Pitch Day](#). U.S. Air Force leaders emphasized their commitment to the quick acquisition of innovative commercial technologies by awarding a total of \$9 million to 12 companies on the first Air Force Space Pitch. Each of the 12 companies received a \$750,000 check and signed a contract on the spot during the event organized by the Air Force and Starburst Aerospace, an aerospace startup accelerator.

### ***Incubators***

EXAMPLE: [ESA's Business Incubation Centres](#): ESA Technology Transfer and Business Incubation Office initiated its ESA Business Incubation Centres (ESA BICs) in 2003 to inspire and work with entrepreneurs to turn space-connected

business ideas into commercial start-ups companies. This has proven to be a very successful initiative. Over 700 start-ups have been fostered throughout Europe with thousands of new high tech jobs created thanks to the applications of space systems, the valorization of ESA intellectual properties, and the space technologies transfers - and more than 180 new start-ups are taken in yearly at the ESA BICs.

EXAMPLE: [Blue Tech Incubator](#): BTI fosters early-stage, innovative, science-based ocean & water/wastewater tech companies, helping propel them to greater opportunity and financial viability.

### ***Non-Governmental Organizations (NGO)***

EXAMPLE: [DataKind](#) - more of a tech transfer/capacity-building type of initiative. They bring together top data scientists with leading social change organizations to collaborate on analytics and advanced algorithms to maximize social impact. From evening or weekend events to multi-month projects, all are designed to provide social organizations with the pro bono data science innovation team they need to tackle critical humanitarian issues in the fields of education, poverty, health, human rights, the environment, and cities.

EXAMPLE: [Nethope](#) - is a consortium of nearly 60 leading global nonprofits, empowers committed organizations to change the world through the power of technology. Its members deliver over 60 percent of all annual, international, non-governmental aid. NetHope unites with over 60 technology companies and funding partners to design, fund, implement, adapt, and scale innovative approaches to solve development, humanitarian, and conservation challenges. Together, the NetHope community strives to transform the world, building a platform of hope for those who receive aid and those who deliver it.

EXAMPLE: [CMP](#) - The Conservation Measures Partnership (CMP) is a joint venture of 27 conservation organizations and grantmakers that are committed to improving the practice of conservation. By participating in CMP, member organizations seek to capitalize on their individual and collective experience to avoid duplication of effort, bypass tried but failed approaches, and quickly identify and adopt best practices. CMP strives to serve as a dynamic and active catalyst for promoting innovation in monitoring and evaluation in conservation

### ***Foundations***

EXAMPLE: [MOORE Foundation](#)- This is an independent non-profit organization that invests in, among other things, the application of geospatial science for public benefit. For example, the foundation funded a project focused on Wildfire Risk



Mapping and Early Detection. The goal was to leverage advances in remote sensing, artificial intelligence, real-time modeling, and cloud computing technologies to support dynamic and analytic wildfire risk mapping and response.

EXAMPLE: [CDC Foundation](#)- This is an independent non-profit organization created by Congress to help mobilize philanthropic and private-sector resources to support CDC's health protection work. They serve as a strategic implementing partner to foster and manage CDC collaborations with private and philanthropic partners, allowing CDC experts to focus on science. These collaborations can range from small programs to multi-partner initiatives. CDC Foundation also has ambassador roles in helping facilitate collaboration.

### **Corporate Structures**

EXAMPLE: [The Small Business Innovation Research \(SBIR\)](#): The SBIR Program encourages small businesses to engage in R&D that has the potential for commercialization and public benefit. SBIR provides seed funds for small business concerns (SBCs) to explore their technological potential and the incentive for SBCs to profit from the commercialization of their innovations. CDC's SBIR Program targets innovations in diagnostics, surveillance, and public health to support the health promotion and disease prevention needs of the CDC.

EXAMPLE: Google allows employees to take time to support NGO projects where Google engineers, analysts, and others can support given their technical expertise. There could be an opportunity to foster wider adoption of NASA technology for these projects. Amazon offers a wide array of relationships for startups and small businesses that use their cloud. Each of these represents a lynchpin for NASA ASP to insert its benefits and partner.

EXAMPLE: Corporate Social Responsibility efforts of companies can also contribute to open data ecosystem and support different use cases when these data are leveraged alongside NASA data (e.g. Facebook's population density data for 20+ low and middle income countries, Esri's open data, Maxar's Open Data Program and university engagement, Planet's open data and ambassador program, etc. )

EXAMPLE: Beyond open data, many companies have some in-kind data/tech access that could be expanded with NASA EO science and technologies (e.g. AWS' credits for universities, Zillow's data access for research, and Microsoft's free platforms for non-profits)

EXAMPLE: Convene competitors who use NASA data or tools in a pre-competitive consortium, e.g., the Cornell University Vegetable Breeding Institute, which annually convenes vicious competitors in a pre-competitive, brokered space to set strategies to keep fueling the commercial pipelines and to ensure talent is being trained properly with many commercial internship and other experiences before students graduate and go on the job market.

***Multi-sector consortia***

EXAMPLE: [The Government-University-Industry Research Roundtable \(GUIRR\)](#): GUIRR convenes senior-most representatives from government, universities, and industry to define and explore critical issues related to the national and global science and technology agenda that are of shared interest; to frame the next critical question stemming from current debate and analysis, and to incubate activities of on-going value to the stakeholders. GUIRR provides a unique forum for dialogue among top government, university, and industry leaders of the national science and technology enterprise.

EXAMPLE: Association of Public and Land Grant Universities (APLU) [Public Impact Research Initiative](#). This APLU effort could be a focal point for ASP to reach multiple (more than 60) public universities that are focused on developing partnerships that can directly connect academic research to a range of complex global challenges including “intense health emergencies, global climate change, and the challenge of providing national and international food security.”