I. Individual information for winner announcement

Please provide your preferred information for use in announcing the winners of the competition. If you are on a team, please copy this section as needed and complete it for each team member.

Team Member 1
- Name (first and last name or first name and last initial): Rowan Mahajan (she/her)
- Hometown: Fairfax, VA
- Who you are (mini-bio) and what you do professionally: I'm a Business Intelligence Analyst at HunaTek, a member of the native-owned Huna Totem Corporation. Most of my work revolves around aiding federal agencies in better understand the data that they already have and utilizing it to better meet their goals and help make more informed decisions. I spend my days in Power BI, bringing real time insights into performance metrics for clients with a variety of data familiarity and seniority. I start with the raw data itself, create relational models, and then provide visualizations to meet custom needs. I have a deep love for astronomy that started when I was quite young, being obsessed with rocket ships and stars for as long as I can remember. Some years later, I studied astronomy and biology at the University of Virginia, then earned a Masters in Decision Analytics at Virginia Commonwealth University. Outside of work, I try to spend my time watching scary movies, painting, and planning too many trips.

Team Member 2
- Name (first and last name or first name and last initial): Meredith Flabiano
- Hometown: Dallas, TX
- Who you are (mini-bio) and what you do professionally: I am a Cost and Data Analyst with the Business Analytics Team at HunaTek, an Alaskan Native Corporation that provides management consulting and logistics services to various federal agencies. My day-to-day role supports the Marine Corps and Department of Homeland Security in developing complex cost models and decision support analyses that help inform budget requests and recommend courses of action for a myriad of programs. Growing up, I did not have a strong desire to work in cost estimation, rather, I had always been interested in science and fell in love with astronomy after my first physics course in high school. Knowing this was where my heart and mind lied, I graduated with a Bachelor of Science in Astronomy-Physics from the University of Virginia. After 4 years of constant studying, late nights in the library and at the observatory, I decided to pivot my focus elsewhere to expand my knowledgebase and skillset. I earned a Master of Science in Marketing and Management from the McIntire School of Commerce at UVA, which helped direct me to the position I am in today. In my free time, I enjoy checking off visits to National Parks (15 so far), taking long drives with my dog, experiencing new things with friends, and visiting family back home any chance I get.

Team Member 3
- Name (first and last name or first name and last initial): Nicholas Anderson
- Hometown: Alexandria, VA
- Who you are (mini-bio) and what you do professionally: I am a Cost Analyst with the Hunatek Professional Services Business Analytics Team, where I work on developing cost models

and other analytical products for government customers, including the Marine Corps and Joint Program Executive Offices. I hold a B.S. in Astronomy/Physics from the University of Virginia and an M.A. in Musicology from the Eastman School of Music. Outside of work hours, I enjoy playing music and going to concerts, cooking and trying new restaurants, and buying more books and stationery items than I could feasibly use.

Team Member 4
- Name: Ben Walzer
- Hometown: Falls Church, VA
- Who you are (mini-bio) and what you do professionally: I am a Cost Analyst and Data Scientist at Kalman & Company, which is a Women Owned Small Business that provides management consulting services to federal government entities. In my role at Kalman I work in supporting federal acquisition programs in developing cost and decision support analyses, which help to build defensible budget requests and determine strategic courses of action. I also support a wide variety of data analytics efforts which cut across the data visualization, business intelligence, automation, and AI/ML domains. In my free time I enjoy hiking, paddleboarding, and camping with my wife and dog, and also working on a never-ending list of house projects.

II. Team submission write-up

The below will provide useful additional context to both the challenge organizers and the broader DrivenData challenge community. Information included in this section may be shared publicly along with challenge results. You can respond to these questions in an e-mail or as an attached file. Please number your responses.

1. What motivated you to compete in this challenge?

The four of us spend our time professionally working with a myriad of data for various end goals, from budget analysis and predictive analytics to data visualization—all with a central focus on utilizing data to help inform decisions. We came across the Pale Blue Dot Data Challenge and thought it would be a great opportunity to employ and expand our skillsets, while gaining exposure to different types of data and domains that we typically do not work with. We mostly work supporting government agencies and work with financial, logistics, and operational data, and this was a unique opportunity to do something out of the ordinary in working with satellite observation data to develop a (hopefully) impactful data visualization. The challenge combined our shared passions for astronomy and earth science, while also allowing us to build an informative product that would help advance some of the urgent challenges that our world is facing.

2. High level summary of your approach: what did you do and why?

Our team was initially drawn to the topic of wildfires by our recollection of Canada's extreme 2023 fire season and the personal impact it had on all of us living in the Washington, DC area, in which we experienced several days of extremely poor air quality. Perhaps unsurprisingly, most research and attention on US wildfires have focused on the western part of the country. With that in mind, we decided to create a wildfire data product centered around fire incidents and their effects on air quality

in the Eastern US. We intended for this visualization both to expand upon the existing, Western-US-based discussions of fire management and to promote awareness of those discussions in regions less accustomed to handling fire disasters.

Remembering the physical effects we felt from the Canadian wildfires, we were motivated to combine satellite observations of wildfires with air quality indices from monitors across the US to investigate the impacts that wildfires have in areas far removed from the fires themselves. We explored and eventually selected relevant datasets largely through NASA Earthdata's Data Pathfinders and Earthdata Search to show the effects, quite literally, across the map.

We chose Power BI to make our final product due to its capacity for presenting robust numerical visualizations together with text fields, allowing us to tell a powerful story with the data. Within Power BI, we made a simple relational data model from the datasets by linking them together along common coordinates. All metrics could then be simultaneously filtered based on a chosen location, enabling our visuals to readily show regional correlations between the sets. We then developed an overall visual narrative layout to incorporate these visuals with our research on wildfire impacts. By pairing easy-to-understand bar graphs and more complex heatmaps with written captions and callouts, the user is able to travel down the page and understand the magnitude of the effects shown.

3. Did you use any tools for visualization, data preparation, or exploratory data analysis that aren't listed in your submission?

Besides using publicly available data exploration tools like NASA Worldview, Giovanni, VEDA Dashboard, and Earthdata Search, all of our tools utilized in the development of our submission are detailed in our report.

4. What are some other things you tried that didn't necessarily make it into the final workflow (quick overview)?

We were initially considering a third aspect to the visualization that would have involved wildfire effects on forest cover and biodiversity. We spent some time investigating satellite observation data sets along these lines, but decided eventually that the visualization would make a stronger impact if it was more focused, so we narrowed the scope to wildfires and air quality instead.

We also explored various other visualization techniques and formatting to determine the best way to display the data in an interpretable fashion. For example, we iterated on our map visualizations to adjust color, and sizing, and compared utilizing a heat map vs. bubble plots. Additionally, we considered presenting an animation that displayed values over time in Power BI, but ultimately decided that the infographic format would be the most informative and direct the audience to the key areas in the data on which we wanted to focus.

5. If you were to continue working on this problem for the next year, what methods or techniques might you try in order to build on your work so far?

As mentioned in our report, our project could be expanded upon by analyzing the effects wildfires have on different groups of people based on region, socioeconomic status, disability or health conditions, and more; understanding such disparities could help citizens and local governments prepare/mitigate the damage. Bringing in new analysis that is sensitive to these variations would increase the level of insight offered by our project while also opening more discussion into situation-specific solutions for the areas most affected.

Our visualization portrays the wildfire impact on humans, particularly worsening air quality, but doesn't explore wildfire impact on the environment beyond burned area. We would like to bring effects on flora and fauna into our visualization to show the long-term effects of wildfires on critical environmental metrics such as habitat area, biodiversity, and carbon sinks.

Within the visualization itself, we would like to further utilize the interactive abilities of Power BI in two manners. First, improving the interaction between the graphs and maps such that the data could be investigated at a more granular geographic level. This would aid in focused explorations of impacts by location and make the dashboard more meaningful to communities beyond Washington, D.C. Second, manipulating the temporal granularity of the analysis would allow exploration of seasonality, cyclicity, and trends when drawing conclusions about how wildfires have changed over the years. Currently, our visualization bins the geographic position to 0.01 decimal degrees and the temporal data to 24-hour periods; with more development we could improve those bins and allow for a deeper exploration of the data at near real-time.

For all of the improvements mentioned above, a quick way to start seeing the intersection between different datasets would be to expand upon the map visuals in the report. Power BI's built-in Azure maps offer a variety of free-to-use base layers that could provide insights into how wildfires impact areas based on metrics such as population size and breakdown, income, weather patterns, and even the biome of a particular region.

6. Have any of your team members previously participated in a program funded by the U.S. government? If so, which program?

Our companies and team members have participated in other Government sponsored Data Challenges, and Ben Walzer was a member of the team that was awarded first place at the [NASA Risky Business](#) Data Challenge in 2022.