COSPAR Inclusion, Diversity, Equity, and Accessibility Panel; Athens, Greece; July 2022

The Future of Human Space Flight, Why Diversity is Critical to its Survival

Kathryn L. Lueders, September 2022

Humanity is experiencing an incredibly exciting time in space exploration. In fact, NASA missions like Artemis I, James Webb Space Telescope, and Earth observation instruments like the Earth Surface Mineral Dust Source Investigation (EMIT), the Orbiting Carbon Observatory-2 (OCO-2), and ECOsystem Spaceborne Thermal Radiometer Experiment (EcoStress); technology development like the Lunar Reconnaissance Orbiter (LRO) and the Double Asteroid Redirection Test (DART) are just a few activities contributing to an increase in interest and participation within the space community across the globe. In human exploration and operations specifically, we are simultaneously maintaining multiple platforms on the ground, in low-Earth orbit (LEO) and very soon around and on the Moon, all while achieving key milestones and furthering the objectives of human spaceflight.

NASA is one of many stakeholders in the space ecosystem. There are also international and industry partners fully engaged in their own space endeavors who equally rely on the skills and talents of range of professionals. To that end, and to ensure success of future space exploration, it is imperative to continue to create environments and seek ways to bring individuals with varied backgrounds and experiences into the fold. This

not only fuels innovation by offering different perspective to solving long-standing challenges, but it also addresses the growing demand for fresh talent in the industry.

The Growing Demand

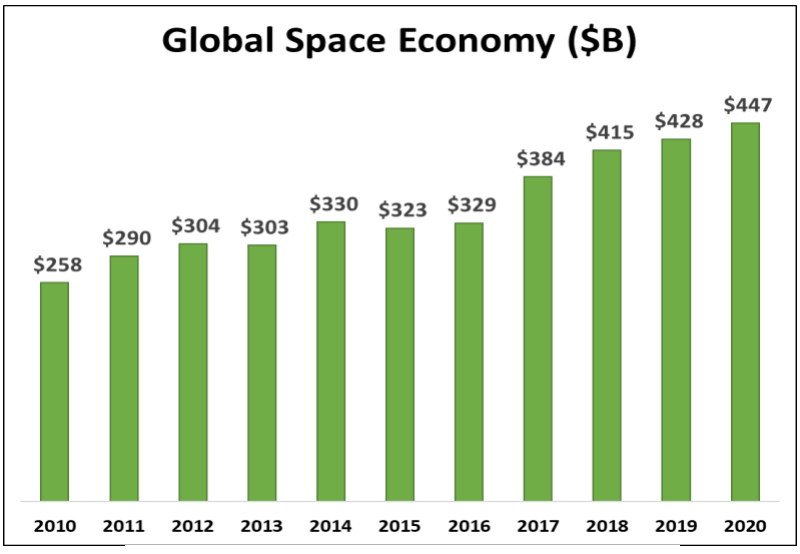
As we push ahead in our modern-day space race, we must keep in mind that we are also in a talent race, which requires all of us to be strategic about how we recruit and keep our workforce.

Pictured:

Hands-on rocket building activities with 5-8th graders.

Encouraging an interest in STEM from a young age is critical to the workforce pipeline.

Every quarter The Space Foundation releases “The Space Report” and publishes their results for the years’ gross domestic product of the Global Space Economy. In their recent 2021 second quarter report, they state the 2020 space economy was $447 billion, an increase of $19 billion, or 4.4%, from the revised 2019 total of $428 billion. The updated projection was 73% higher than the start of the last decade, and part of a five-year trend of uninterrupted growth averaging 7.7% per year, exceeding the U.S. national average of 6.8% per year in this same period.



Source: The Space Foundation

What is most exciting is that to compliment the 4.4% economic growth in 2020, government spending in this equation fell by 1.2%, a true indicator of private sector success. However, while growth and demand has increased, resource availability is limited leading to an increase in competition for talent who can solve some of the toughest challenges we face in space exploration. We need to continue to feed the technology machine that supports our current and emerging space infrastructures, even as that talent is needed to support the growing entertainment, medical, and home product revolution on Earth.

The Workforce Transformation

As a result of the COVID-19 pandemic, we are in one of the most transformational times for our workforce -- whether it remains the "Great Resignation" or what may be viewed in the future as the "Great Transformation". CNBC recently shared a summary of a 2022 McKinsey and Co. report that surveyed more than 13,000 people across the globe, including 6,294 Americans, with results indicating that about 40% of workers are considering quitting their current jobs in the next three to six months.

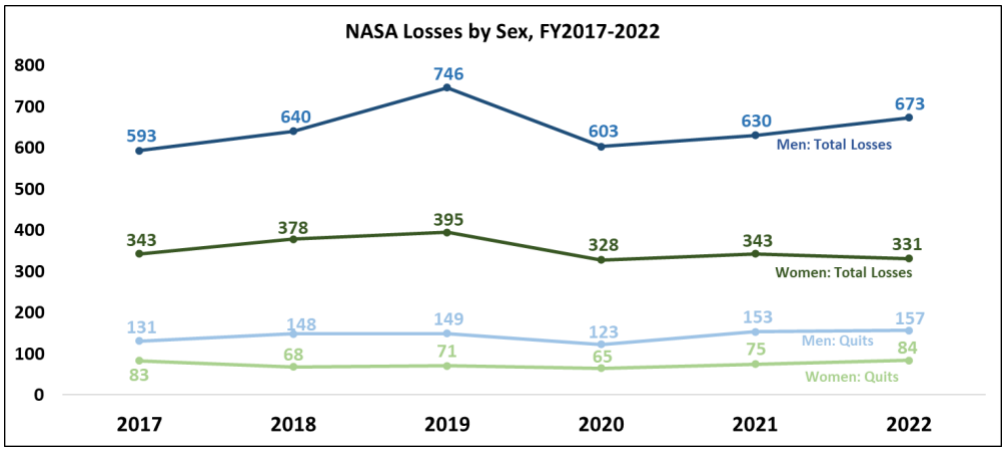
According to the U.S. Census Bureau, by the end of 2020, working women, accounting for approximately 48% of the civilian labor force, fell 3.9 percentage points (7%), and unemployment rose 4.7 percentage points (131%); and men, who accounted for approximately 52% of the civilian work force, fell 4.2 percentage points (6%), and unemployment rose 4.1 percentage points (111%). With increased competition for talent and more options available to workers who are re-evaluating their roles in the workplace, the data shows that the workforce is dynamic.

	% In Labor Force		% Unemployed	
	Men	Women	Men	Women
2020	62.4	51.5	7.8	8.3
2019	66.6	55.4	3.7	3.6
2018	66.3	54.9	3.9	3.8
2017	65.8	54.1	4.9	4.8

Source: U.S. Census Bureau

NASA, although voted best place to work in the federal government for 10 consecutive years, is not immune to this effect. Between FY 2017 and FY 2022, approximately 1,000 employees have left the agency each year (including retirements, removals, separations, and deaths). Unlike the U.S. Labor market, NASA saw an increase in

losses with a spike in 2019. During 2020, there were fewer losses compared to both FY2019, the peak year for NASA, and FY2018, followed by slow growth. Women have accounted for approximately 36% of all losses, showing slightly less volatility. We must pay attention to these trends because the NASA workforce is equally dynamic.



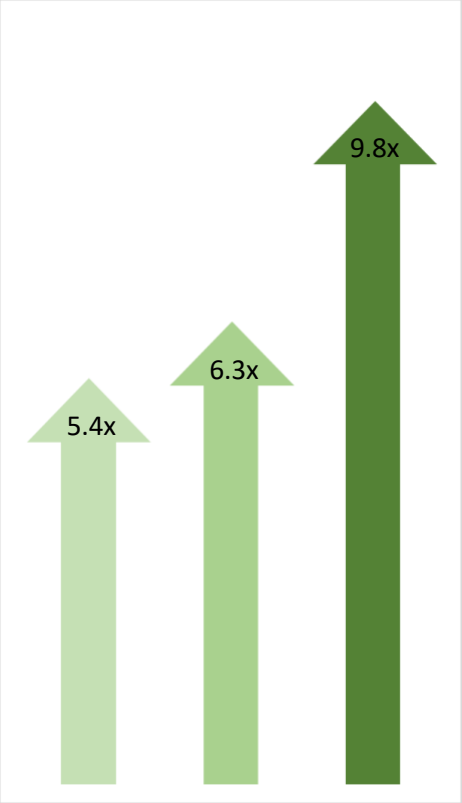
Source: NASA HQ Office of Diversity and Equal Opportunity

Playing on a well-worn but well recognized phrase, '*Space World, we have a problem*' – Bonnie Dowling, one author of the McKinsey report, says of the elevated quit rates, "There's been a fundamental shift in workers' mentality, and their willingness to prioritize other things in their life beyond whatever job they hold. We are never going back to how things were in 2019." Dowling continued by saying, "People aren't tolerating toxic bosses and toxic cultures anymore, because they can leave and find other ways to make money without being in a negative situation."

The Survival of Human Space Flight

As people who love to solve problems, NASA is invested and committed to studying, assessing, and addressing challenges to recruiting and retaining talent. One obvious solution is to create environments where the best and the brightest are drawn to work.

A viable option for addressing downward trends in workforce retention is Inclusion, Diversity, Equity, and Accessibility (IDEA) programs. The blog GreatPlaceToWork laid out statistics that shed light on why IDEA programs formulated under the Individuals with Disabilities Education Act are important to the space business. It notes that, companies with a strong diversity and inclusion environment have an increased ability to recruit from a diverse talent pool and have a 5.4 times higher rate of employee retention.



Source: A Great Place to Work

Their research on company culture shows that when employees trust they and their colleagues will be treated fairly – regardless of race, gender, sexual orientation, or age – they are 9.8 times more likely to look forward to going to work, 6.3 times more likely to have pride in their work, and 5.4 times more likely to stay a long time with their company. Even if one of the trends is accurate, diversity and inclusion programs are an important tool in our ability to attract and retain talent.

As an industry, we need to continue to monitor what works and what doesn't. As engineers, scientists, technocrats; we sometimes forget that people aren't programmed robots. We all have inherent biases, which is why it is important – especially in the workplace – to be exposed to different views, perspectives and backgrounds to break down barriers, improve communication and stimulate innovation. This will lead us to a place where IDEA is a normal part of the work environment and engrained in the fabric of the culture.

At NASA, I have personally seen the benefit of working in this manner. Our relationships with our international partners in the construction and operation of the International Space Station (ISS) over the last 22 years have been an incredible achievement. Scientific partnerships, including James Webb telescope, the Mars

Perseverance mission, the Alpha Magnetic Spectrometer, and many more have created amazing sets of data and research opportunities. These efforts were made successful by people of many backgrounds, nationalities, and with different norms learning to work together.

Today, we begin a bold new international endeavor – the launch of Artemis I. This mission is yet another feat of a diverse international, government, and industry teams pushing us forward into space as we return to the Moon. There are even harder missions ahead of us which will require the same benefit of allowing and welcoming workforce differences as a necessity in accomplishing increasingly complex missions in the future.

It is a matter of survival.