



*THE AEROSPACE CORPORATION*  
***CREATING AN AGILE  
SPACE ENTERPRISE***  
2018

## *Corporate Profile*

The Aerospace Corporation is a national nonprofit corporation that operates a federally funded research and development center (FFRDC) and has approximately 4,000 employees. With three major locations in El Segundo, Calif., Colorado Springs and Washington, D.C., Aerospace addresses complex problems with agility, innovation, and objective, technical leadership across the space enterprise and other areas of national significance.

FFRDCs fill a unique role in service to the government and the nation. Along with commercial industry and academia, FFRDCs support government science, engineering, and technology development. FFRDCs do not compete with industry and do not manufacture products, eliminating conflict of interest, which enables them to work with industry on important problems. FFRDCs operate as strategic partners with their sponsoring government agencies to ensure the highest levels of objectivity and technical excellence.

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## *A Letter from the Chairman of the Board and President–CEO*

In a year of dramatic change with vast opportunities, The Aerospace Corporation harnessed its deep technical and programmatic expertise, vision, and resolve to forge a record of remarkable accomplishments that met current and emerging demands from its nationwide customers.

Anticipating tomorrow’s challenges, the company’s strategic imperatives—**Shaping the Future, Innovation, Growth in Our Value, and Velocity**—were instrumental in strengthening the nation’s space

enterprise and helping our core customers stay ahead of increasing threats and exploit new technological opportunities. Working with industry and government, Aerospace enabled more agile, innovative, and capable space operations. Recognizing the urgent need for more resilience, Aerospace moved individual space programs toward an integrated enterprise architecture. In an era demanding greater innovation and anticipation of customer needs, Aerospace made crucial internal investments to increase prototyping for rapid technological development and insertion to upgrade capabilities. To achieve greater

speed, the company actively encouraged government partners and customers to streamline decision-making on requirements, resources, and acquisitions.

Some of the key achievements that reflect these efforts include:

- Supporting the mission success of four national security space launches while promoting the advancement of new launch vehicles, including Blue Origin's New Glenn, SpaceX's Falcon 9 Block 5 vehicle, Northrop Grumman's Omega, and United Launch Alliance's Vulcan.
- Developing a resilient architecture for space as a warfighting domain to deter aggression and ensure continuing mission success in any conflict that extends into space.
- Expanding new frontiers for CubeSats, including NASA's successful Optical Communications and Sensor Demonstration (OCSD), whose novel laser communication system transmitted data at 100 megabits per second, thereby redefining the utility of smallsats.
- Introducing unique innovations such as the Rogue-1 CubeSat, 3D-printed hybrid rocket engines, and the Near Infrared Airglow Camera (NIRAC), as well as promising prototypes nurtured through our new Sabbatical Program.
- Forming the Space Ventures Coalition, a partnership with academia and industry that will promote the use of emerging start-up technologies to address the Air Force and NASA's hardest problems.
- Establishing 10 engineering, science and technology hubs to help define our corporate strategy in these areas while prioritizing their respective investments and enabling our customers' roadmaps.
- Supporting advanced space vehicles that will provide new, exquisite, and resilient capabilities to classified programs to meet our nation's pressing security needs.
- Delivering critical mission support to eight NASA spacewalks to install and replace vital components on the International Space Station, as well as one Russian spacewalk at the space station.

- Supporting the Next-Generation Overhead Persistent Infrared (OPIR) and other critical programs emerging from the use of rapid procurement authorities.
- Developing new operational concepts such as Launch-U, Launch on Demand, and Ship and Shoot, to expand and expedite future launch opportunities.
- Providing guidance and technical recommendations to the Missile Defense Agency and Ground Based Strategic Deterrent Program to solve some of the most complex challenges confronting our national security.

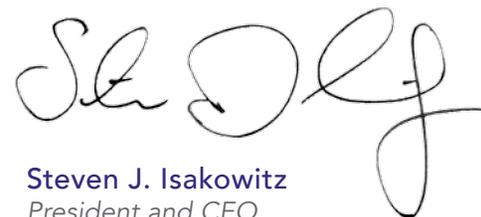
We developed new capabilities to increase the resilience of satellite constellations, and ushered in the next-generation GPS-III satellites. We also continued the drive to mission success by applying systems engineering principles across the space enterprise. In addition, we achieved broader mission effectiveness and efficiency by expanding our *Agile Mission Assurance* initiative by employing advanced information technology, new approaches for disruptive space technologies, and novel acquisition strategies and business practices.

In this historic time, our corporate values—**Dedication to Mission Success, Technical Excellence, Commitment to Our People, Objectivity and Integrity, and Innovation**—are the bedrock for fulfilling our aspirations in an evolving future. As the home of the nation's only federally funded research and development center fully devoted to space, Aerospace remains unshakably committed to delivering technical leadership and innovative solutions to our government and industry partners for programs of national significance.



Michael B. Donley

Michael B. Donley  
Chairman of the Board



Steven J. Isakowitz

Steven J. Isakowitz  
President and CEO

## *Our Strategic Imperatives*

The United States faces rapidly growing threats to our space capabilities and Aerospace has the opportunity to take bold leaps to provide solutions for military, civil, and commercial customers. Aerospace is developing strategies to outpace the threats and leverage emerging capabilities, including: enabling faster production, fostering the development of new technologies, integrating space architectural elements, and increasing the speed of decision-making efforts.

### ***SHAPING THE FUTURE***

*Partnering for Success*

### ***INNOVATION***

*Meeting New Challenges*



# ***GROWTH IN OUR VALUE***

Increasing Value to the Enterprise



# ***VELOCITY***

Responsive, Effective Execution

***“Partnerships are absolutely critical to us. In a contested space environment, partnerships strengthen our advantage and complicate potential adversary decision-making.”***

***– Gen. John Raymond,  
U.S. Air Force***

## **Addressing the Threat: Resilient Space Architecture**

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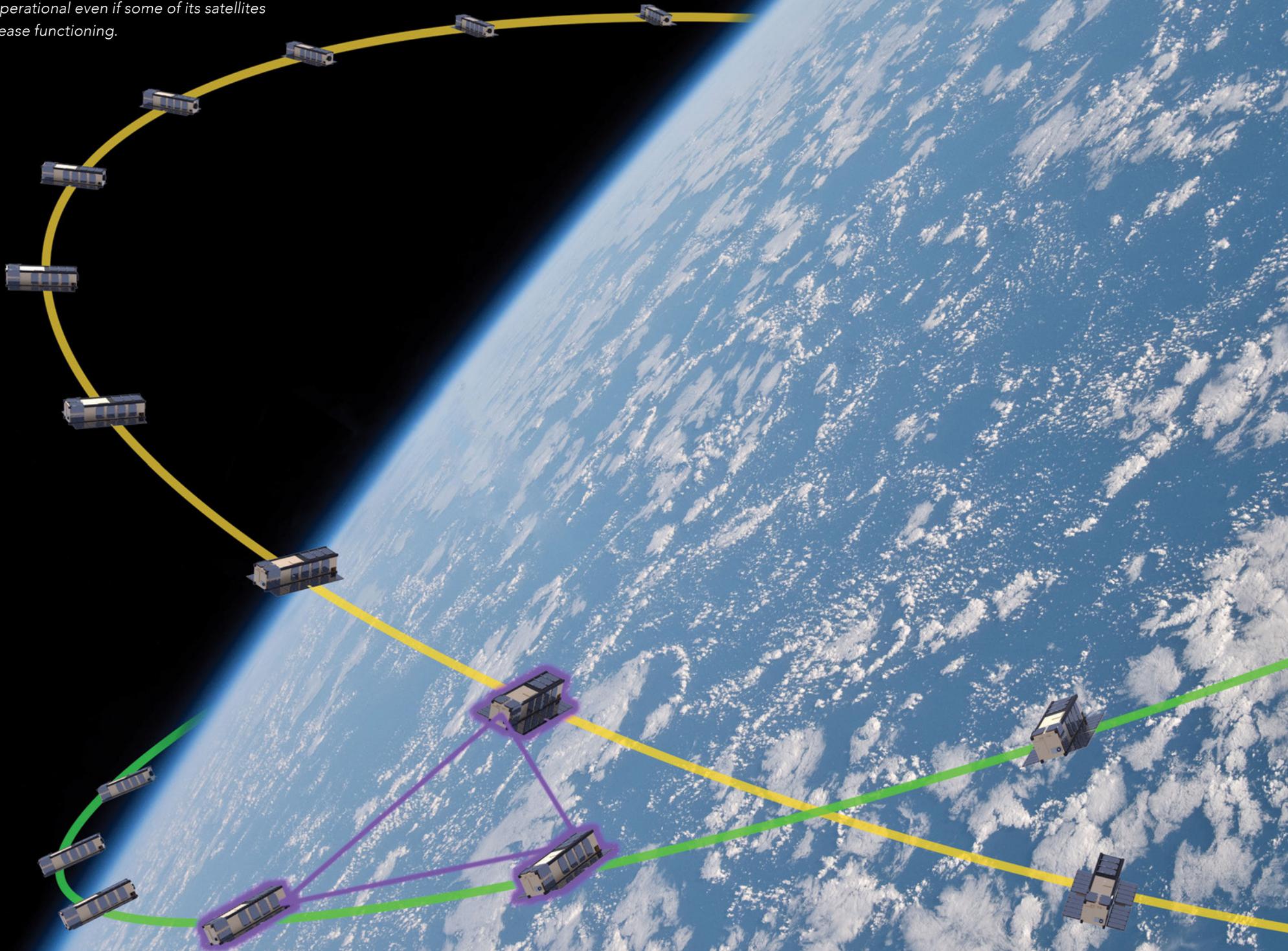
*The threat environment is changing fast—so the future space enterprise must move even faster.*

Adversaries great and small understand the importance of U.S. space capabilities and continually seek to undermine them—through physical and digital means. To counter this evolving threat, future space systems must be both defensible and resilient.

Aerospace has been devising methods to achieve a more resilient and integrated space architecture, one that will quickly recover from an adverse event. The multifaceted approach draws upon rapid development, fast procurement, responsive launch, and distributed system function. In many regards, it requires a whole new way of thinking about the overall space enterprise.

For example, one approach to achieving greater resilience relies on rapid replenishment and reconstitution of orbital assets. This, in turn, requires greater speed and efficiency on the factory floor. Aerospace has proposed

*A constellation of CubeSats orbiting in low Earth orbit provides greater space resiliency since it will remain operational even if some of its satellites cease functioning.*







*3D printing can be done with a variety of materials for the best application to specific missions.*

an acquisition paradigm known as Continuous Production Agility (CPA), which emphasizes higher-volume production through standardized design. Aerospace is also helping the government apply innovative acquisition strategies and streamline the decision-making process to maintain a fast development pace.

Advanced ground and launch systems will provide the foundation for a resilient space enterprise. As co-lead of the Range of the Future Task Force, Aerospace is spearheading development of a comprehensive plan to upgrade launch facilities to better accommodate rapid launch rates involving new providers and reusable rockets. Aerospace has also been helping the Air Force enhance its ability to detect a cyber intrusion and is participating in on-orbit demonstrations of cyber defense and situational awareness. This work draws upon comprehensive experience in ground system operations.

Greater speed can mean greater risk in satellite acquisitions, but Aerospace is helping to control those risks. Specifically, Aerospace is applying its extensive expertise in modeling and simulation to fully analyze and evaluate new technologies and space architectures before implementation. Mission assurance techniques are also being revamped to keep up with the faster tempo.

Efforts such as these support the broader vision to augment large, exquisite satellites—which make attractive targets for adversaries—with smaller, distributed clusters and multilayer solutions that are harder to overwhelm and easier to reconstitute.

Aerospace was an early pioneer in developing small satellites and continues to conduct pathfinding research in the field. This expertise, combined with advanced prototyping capabilities, enables Aerospace to quickly address customer needs while reducing development risk. The ability to rapidly build and deploy space assets will expedite technology insertion and ensure that future systems stay well ahead of emerging threats.

Aerospace leverages technology such as cloud computing to perform launch trajectory analysis for faster solutions to our customers' needs.

Photo courtesy of ULA

## Cloud Computing to Perform Launch Trajectory Analysis

THEN



Process took seven to 10 days.

NOW



Process completed in about 15 hours.

***“I look forward to instilling a culture that embraces a more agile approach to development, leveraging the resources that have given us the military capabilities that we enjoy today, and that will give us the ones we will need in the future.”***

***– Dr. Michael D. Griffin, Under Secretary of Defense  
for Research and Engineering***

## ***New Tools and Processes: Faster Launch and Access to Space***

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Our nation requires space capabilities. To ensure success in this area, each national security space (NSS) mission goes through a thorough launch verification process, which has traditionally been time consuming.

Aerospace is leveraging its unique role as an objective technical advisor to bring together government, allies, international, and commercial partners for increased access to space, especially among new entrants to the national security mission.

To achieve this goal, Aerospace has been transforming the mission assurance process to better support our customers, who need rapid access to space, faster acquisition of space assets, and the ability to operate as an enterprise.

It's not enough to simply move faster, because that could increase risk to these critically important NSS functions. Rather, Aerospace is using advances

# PRESENT STARS

in technology, new business models, changes in process, and the best minds in the industry to figure out ways of doing things more efficiently, effectively, and responsively—a process we call *Agile Mission Assurance*.

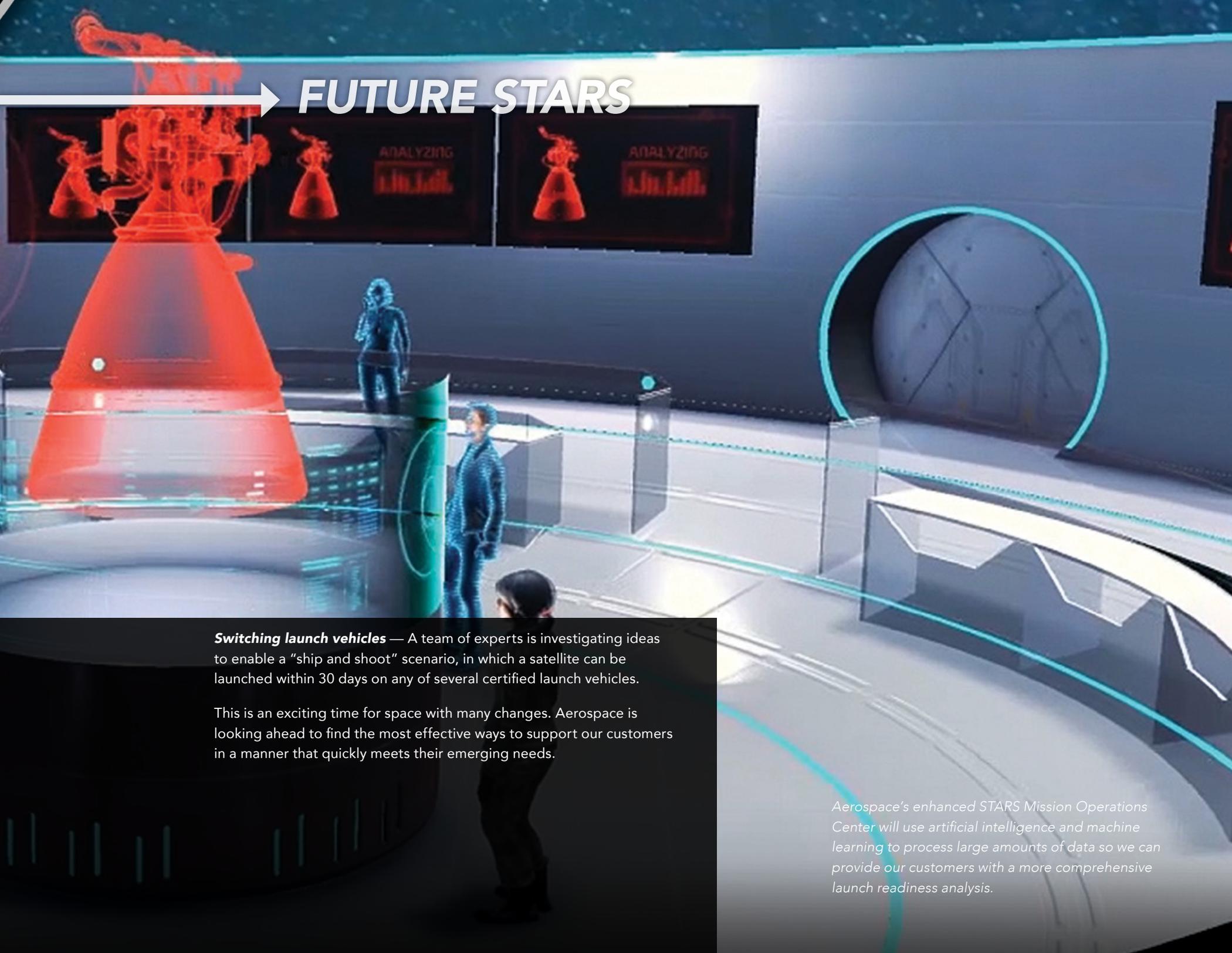
**Leveraging advanced tools** — Aerospace began using cloud computing to perform launch trajectory analysis. This process, which used to take seven to 10 days, can now be completed in about 15 hours. Cloud computing and automated tools have also improved coupled loads analysis. A two- to three-month process for two to four launch configurations now takes two weeks to analyze 1,000+ launch configurations.

**Developing a standard** — Looking at ways to more effectively pair

satellites and launch vehicles, Aerospace led a group from industry, government, and academia that released the Launch Unit (Launch-U) standard at the Small Satellite Conference in August 2018. This standard lays out specs for mid-sized small satellites to enable them to more easily hitch a ride with a larger payload, which will result in more launch opportunities at a lower cost.

**Upgrading mission control** — To enable a more comprehensive launch readiness analysis, Aerospace is planning to upgrade its STARS Mission Operations Center with built-in artificial intelligence and machine learning, which will allow processing of vast quantities of data.

**Considering alternatives** — Aerospace is looking at ways of using alternative (non-space qualified) parts in space systems, such as parts from the automotive industry.



## FUTURE STARS

**Switching launch vehicles** — A team of experts is investigating ideas to enable a “ship and shoot” scenario, in which a satellite can be launched within 30 days on any of several certified launch vehicles.

This is an exciting time for space with many changes. Aerospace is looking ahead to find the most effective ways to support our customers in a manner that quickly meets their emerging needs.

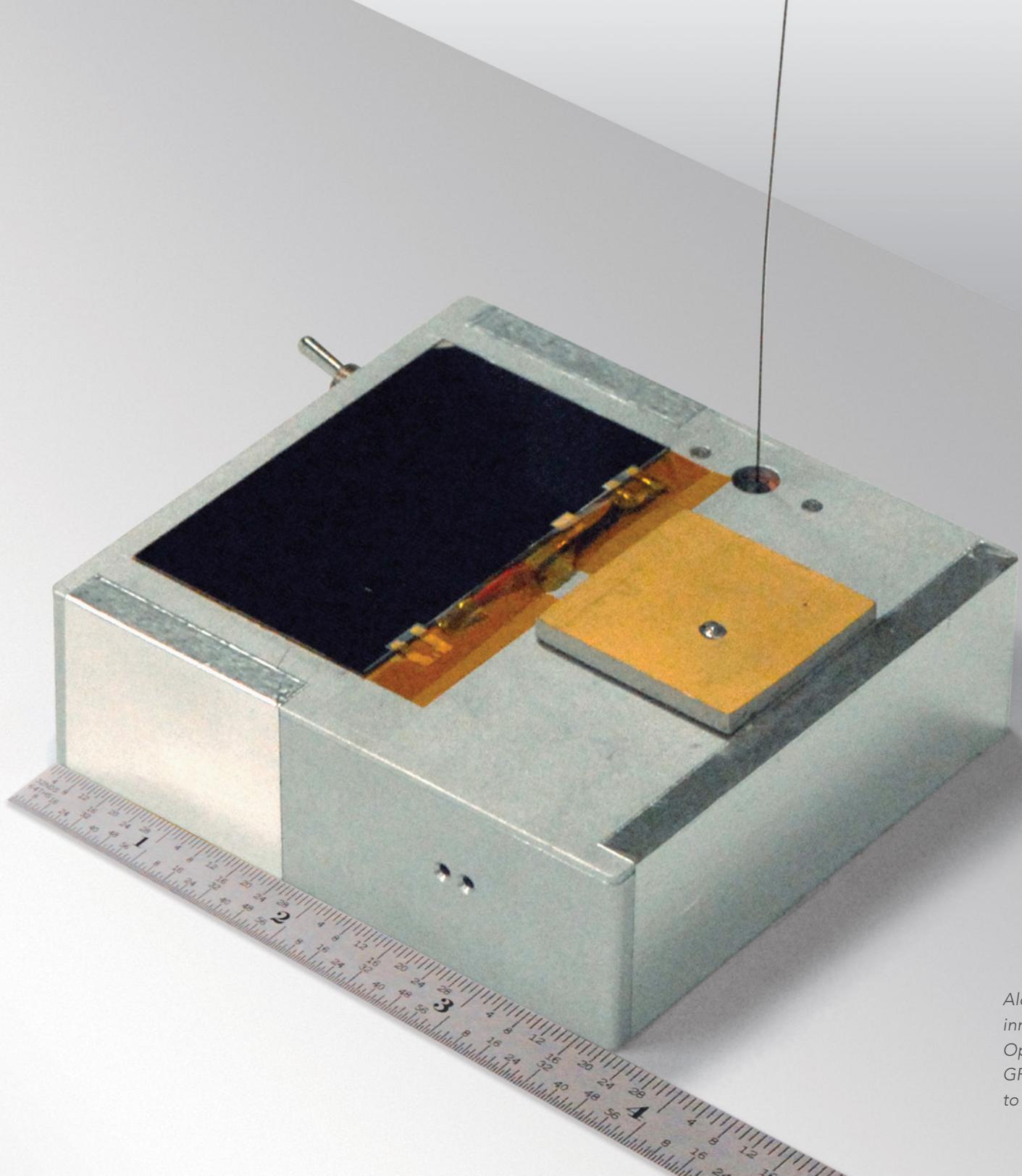
*Aerospace’s enhanced STARS Mission Operations Center will use artificial intelligence and machine learning to process large amounts of data so we can provide our customers with a more comprehensive launch readiness analysis.*

## **Creating a Path Through Contested Space: Space Traffic Management Evolves**

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***“Space already has some 4,500 satellites in addition to the tens of thousands of objects careening around up there, all of which pose a threat to existing satellites. So space situational awareness and space traffic management are becoming very, very important as more and more satellites come up.”***

*– Wilbur Ross, U.S. Secretary of Commerce*



Along with iLab, Aerospace's research and innovation center, the Mission Analysis and Operations Department developed this satellite GPS transponder prototype to track orbiting objects to better determine collision-risk assessment.

*Associate principal director of the Systems Analysis and Simulation Subdivision (SASS), Ted Muelhaupt, in discussion with Aerospace's CORDS team.*



Engineers at Aerospace's Mission Analysis and Operations Department have been focused on the problem of space traffic management (STM), and in 2018 they devised a solution for tracking orbiting objects.

Working with Aerospace laboratories, they created the first prototype of an onboard GPS transponder for satellites and launch vehicle upper stages to actively communicate with tracking stations. The concept for the prototype was originally developed in conjunction with iLab, Aerospace's research and innovation center. As envisioned, the device would transmit GPS data (position, velocity, and time) as well as a unique serial number.

The encrypted signal would be received by ground- or space-based receivers and forwarded to a central coordinator for orbit determination and collision-risk assessment. The increased speed and accuracy would vastly improve calculations of collision probability and reduce the number of costly false alarms.

Meanwhile, Aerospace's Center for Orbital and Reentry Debris Studies (CORDS) continued to showcase its position as a world authority on spacecraft reentry and STM.

One activity was the continuous monitoring of the reentry of Tiangong-1, China's first space station. The deorbiting Tiangong-1's

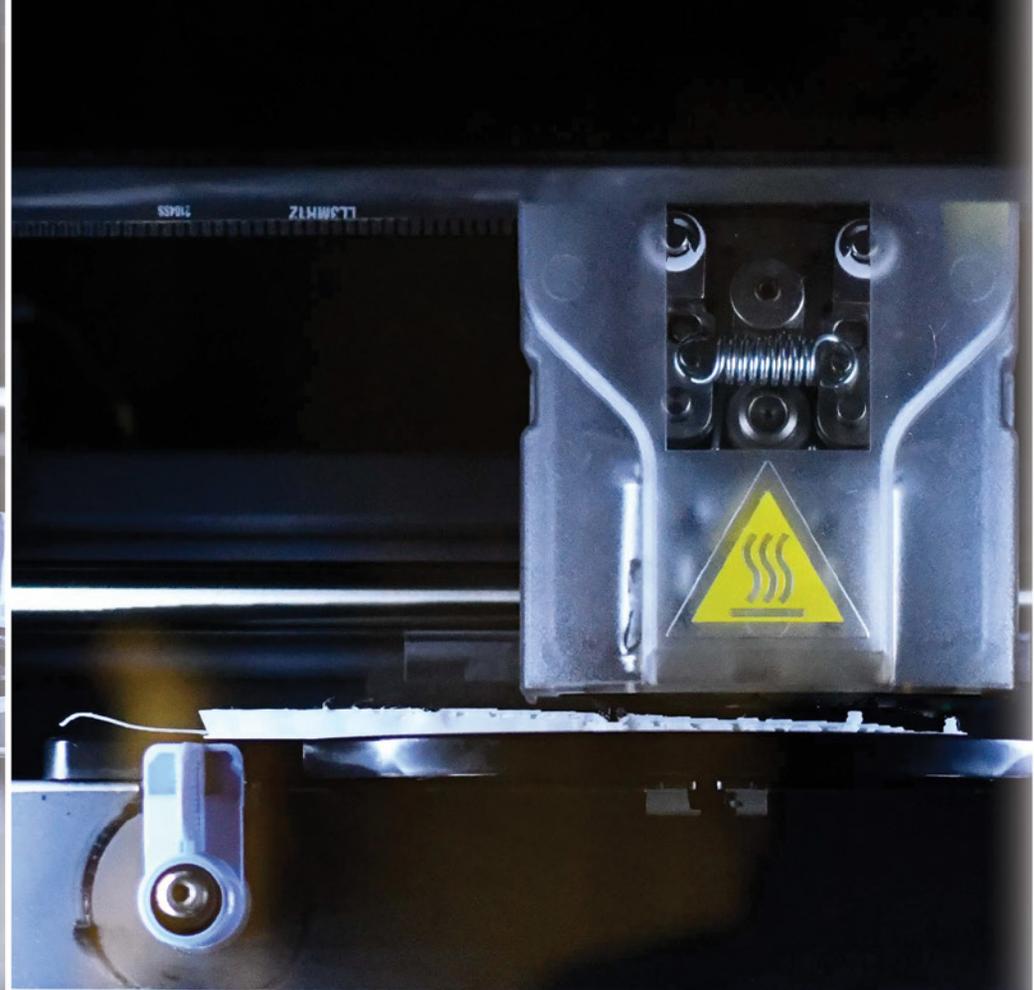
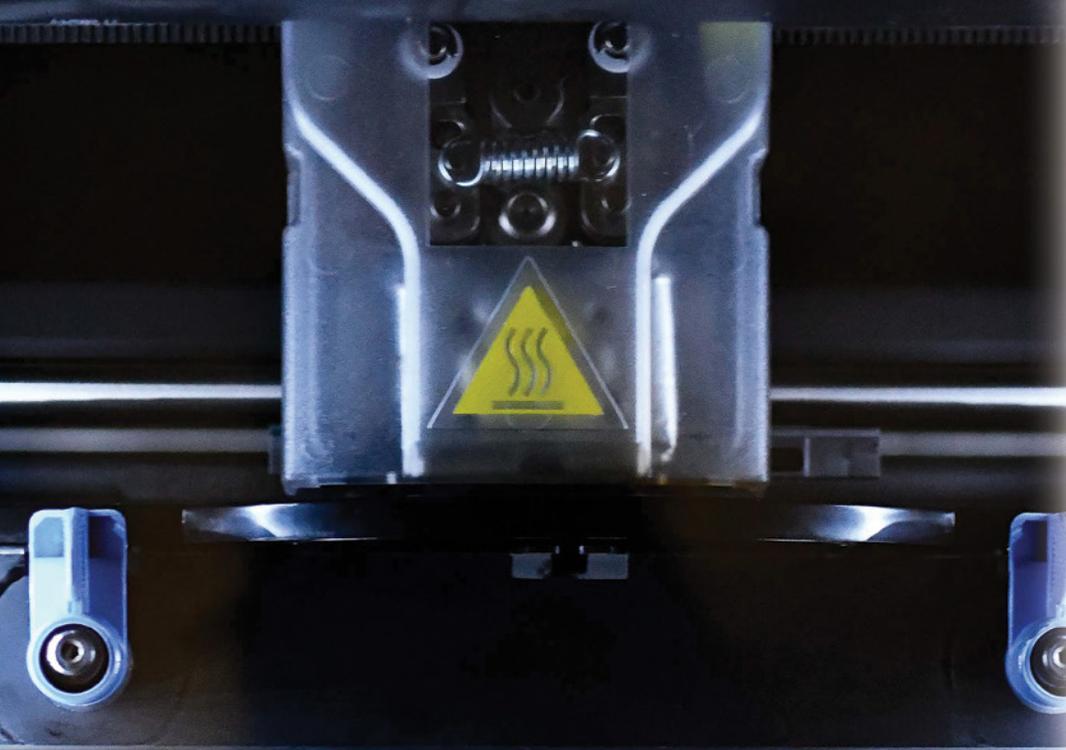


homecoming was of supreme interest to the space industry and the public; it kept aerospace agencies and companies worldwide busy trying to estimate the date and time of its return. As the world watched, Tiangong-1 reentered Earth's atmosphere on April 1, 2018, at 5:16 p.m. PDT. As CORDS predicted, most of the space station burned up upon reentry, with any remaining space debris falling into the South Pacific Ocean.

The U.S. administration announced a plan in early 2018 to significantly increase the Department of Commerce (DOC) role in supporting "American Leadership in Space." The DOC Strategic

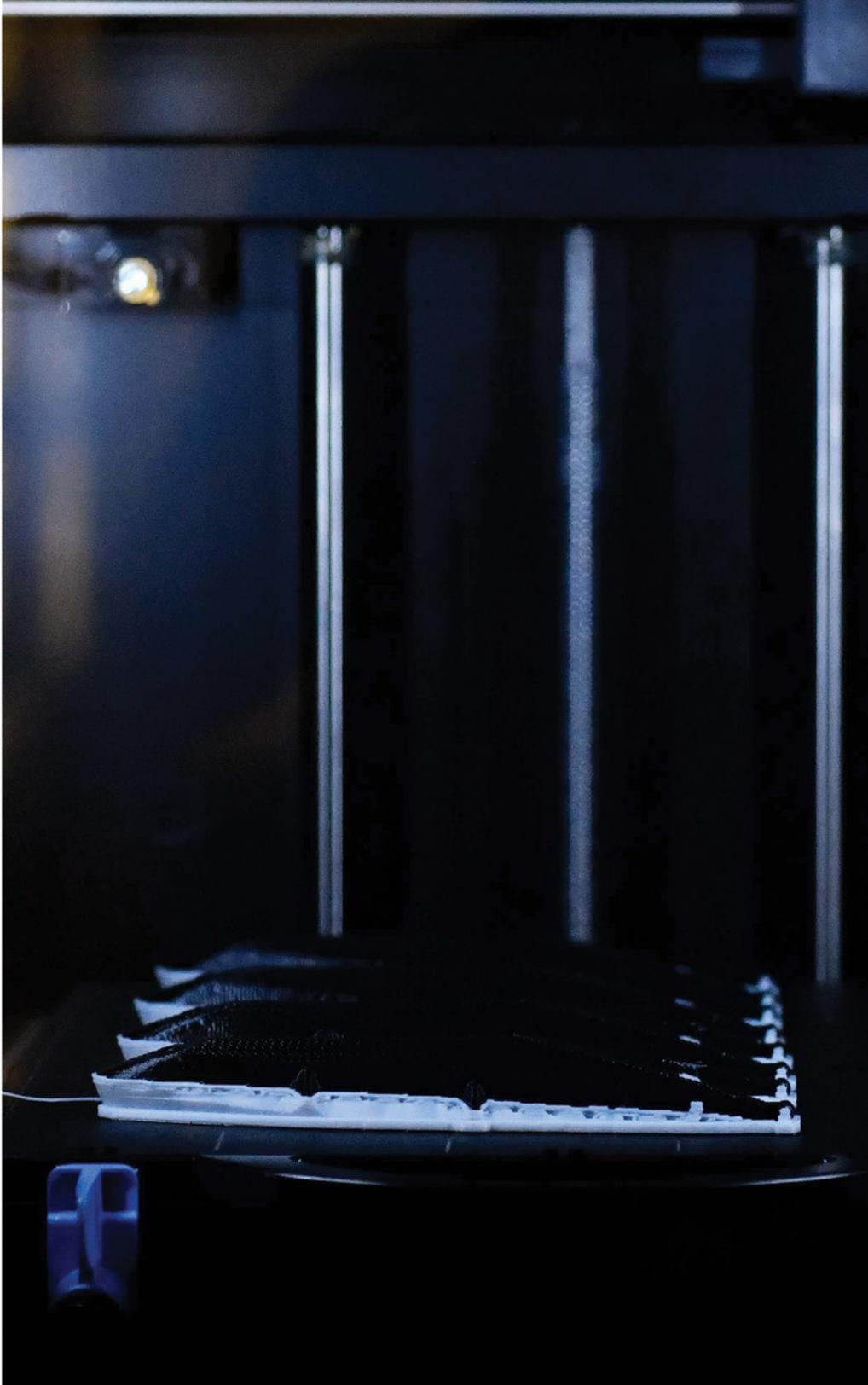
Plan prioritizes the focus on "Expanding Commercial Space Activities," which includes three primary activities: 1) expanding the Office of Space Commerce; 2) active participation in the National Space Council as a key member; and 3) support of American companies operating in space.

Over the past 20 years, Aerospace has used its analytic capabilities and trusted advisory role to perform in-orbit collision analysis and reentry analysis of rocket bodies, satellites, and other orbiting objects, enabled by our expertise in atmospheric physics, materials science, and orbital mechanics. This expertise has been used to support the needs of Aerospace's customers, both military and civil.



***“Targets and threats continue to change at an increasing pace. As proud as we are of our heritage of innovation and recent performance success, we have to continue staying ahead of those targets and threats.”***

***– Betty Sapp, NRO Director***

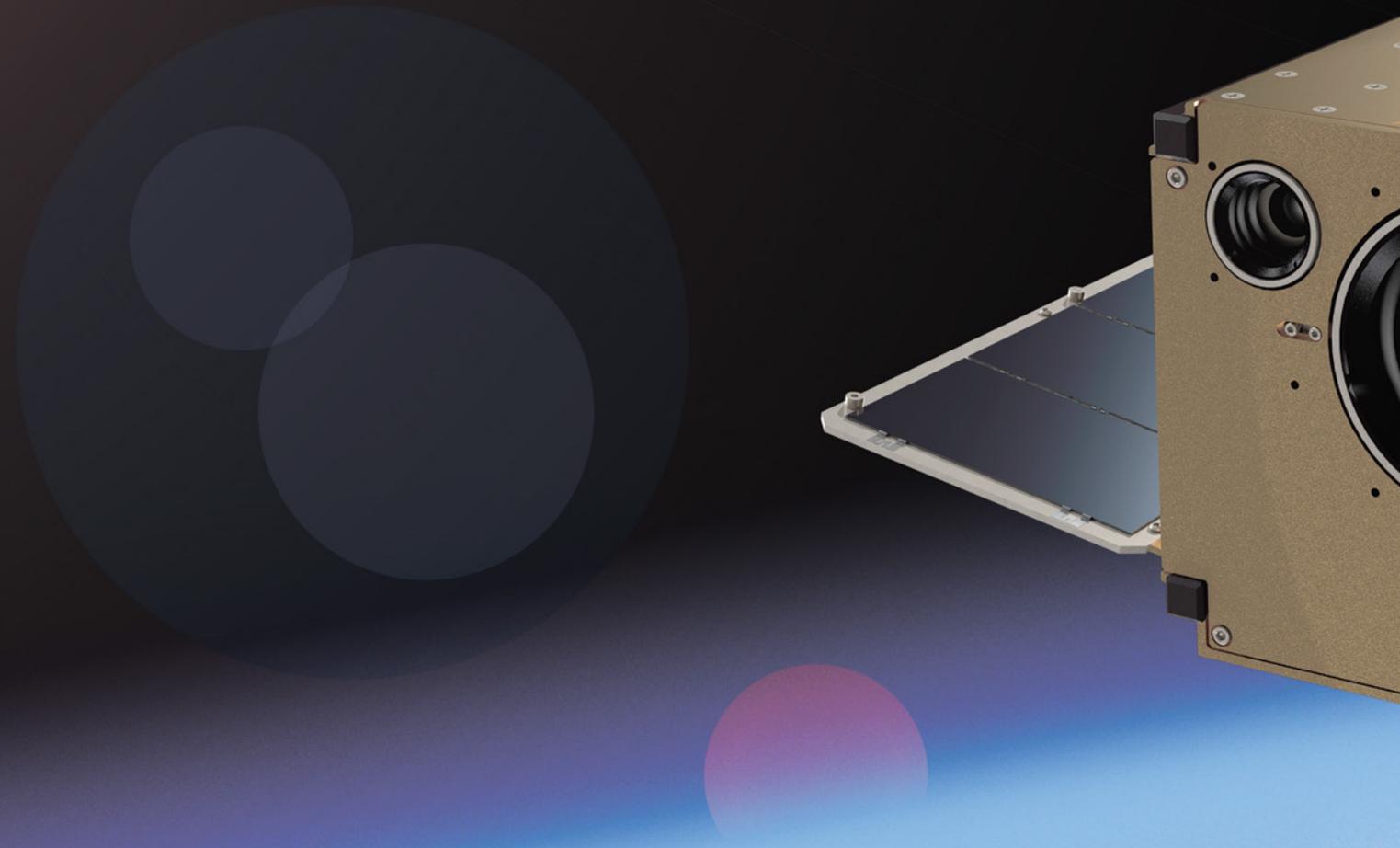


## *Building Smarter and Faster: Prototyping to Disrupt the Threat*

The Aerospace Corporation is increasingly applying its innovation and cutting-edge technology to prototyping, in order to address and resolve threats to space systems for the benefit of our customers and the nation at large.

Aerospace recently adopted a strategy—called “Prototyping to Disrupt”—for using prototyping to accelerate next-generation capabilities. The objective is to reduce satellite size to enable modularity and increase production speed, while also leveraging industry to foster new space providers, to accelerate design transition and spur innovation.

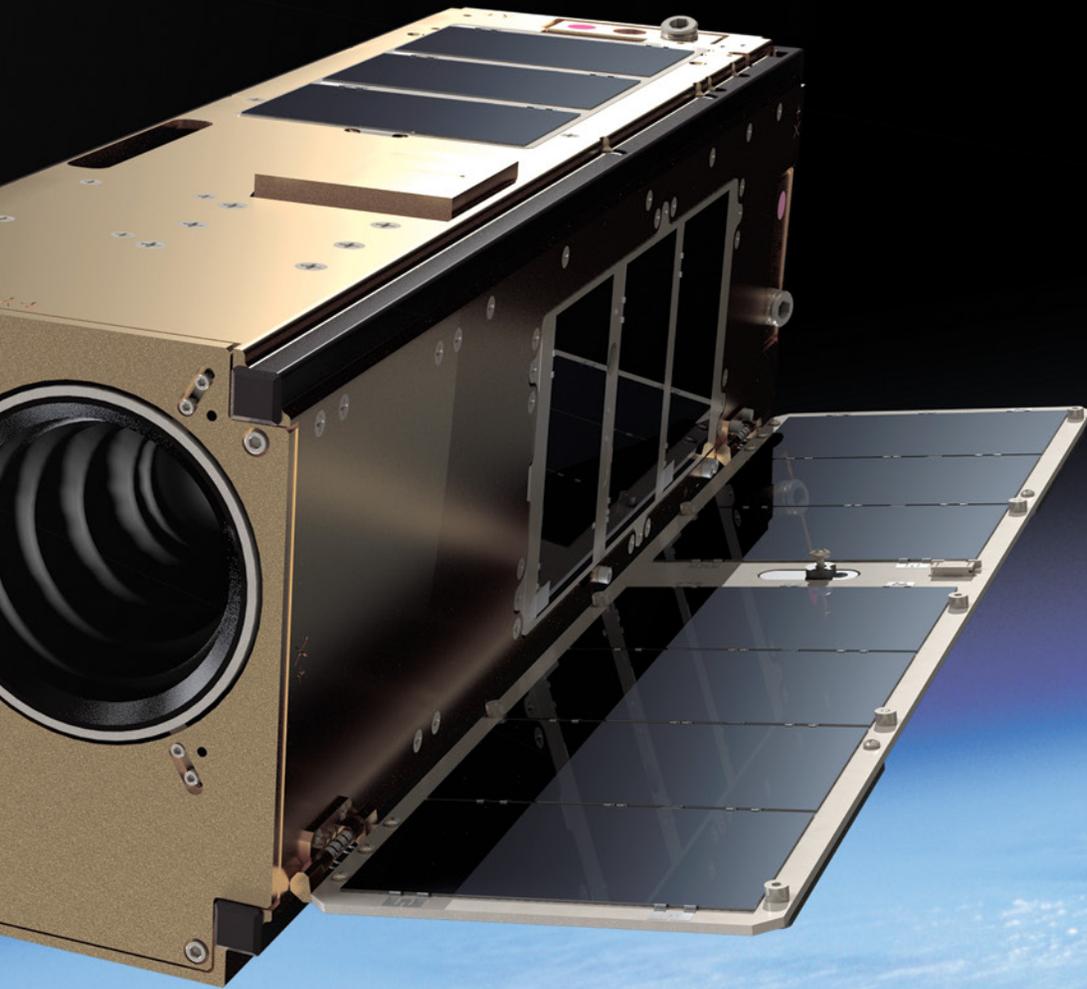
The Rogue-1 prototype concept is a prime example of this bold new approach. Challenged with reconstituting national missile launch warning capability within a month, the Aerospace team developed an innovative concept employing commercially available technology and a small satellite platform. The team quickly designed a first-generation low-Earth-orbit CubeSat-based sensor prototype concept that is now being built for launch and characterization in late 2019 to support future space-based missile warning development decisions.



Other CubeSat-based missions flown by Aerospace include the Optical Communications and Sensor Demonstration (OCSD), which demonstrated high-speed data transmissions to the ground and close-proximity maneuvering in space; and the CubeSat Multispectral Observing System (CUMULOS), designed to study weather and the Earth's environment from space.

Aerospace is also expanding its internal prototyping capabilities to demonstrate smarter, more efficient methodologies that decrease the

need for future engineering changes, while extending final product life. Several Aerospace projects developed in fiscal year 2018 are already showcasing the ability of prototyping to provide critical "proof of concept" methodologies, in addition to significant reductions in cost and development time. Aerospace has developed a new method of measuring low-Earth-orbit satellites' radiation environment, to identify threats to the space enterprise. This project, known as Responsive Environmental Assessment Commercially Hosted, or REACH, led to the development of a space-grade, miniaturized dosimeter that enables



*An example of our “Prototyping to Disrupt” strategy, this Rogue-1 CubeSat concept was designed within a month and the small satellite is being built for launch in 2019.*

more data to be collected in less time, at a fraction of the cost of previous methods.

Aerospace has also successfully tested a new type of 3D-printed rocket motor that could pave the way for less costly and more efficient rocket propulsion. As an alternative to traditional rockets, Aerospace’s new prototype hybrid motor is helically shaped, enabling a liquid or gas oxidizer to interact with solid fuel more effectively, and with dramatically improved performance. Aerospace is also

exploring a variant of a liquid-propelled rocket using a 3D-printed “liquid fuel grain,” which could eliminate much of the plumbing and turbomachinery typically required in liquid motors.

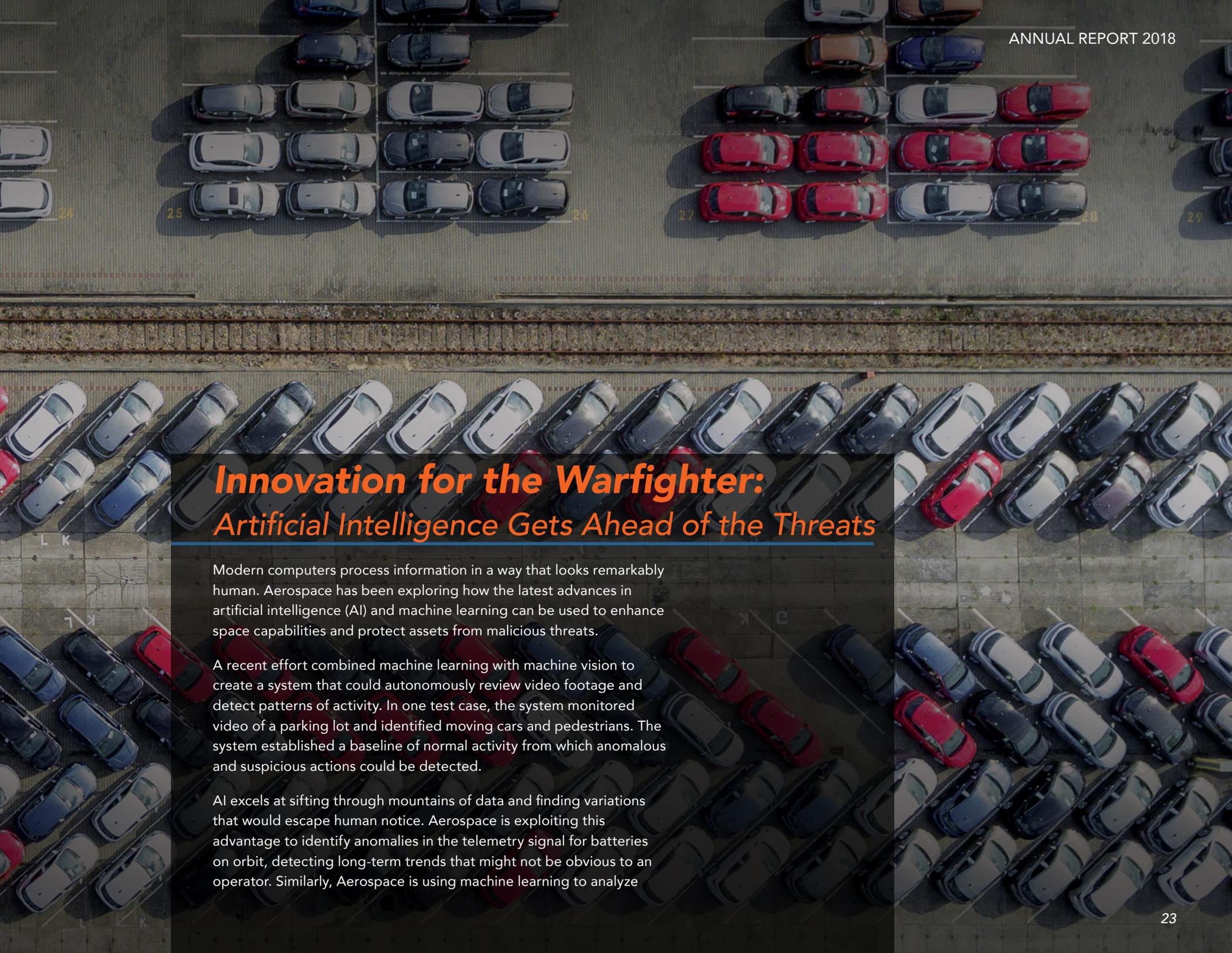
Next-generation space architectures will become increasingly reliant upon Aerospace innovation to meet the escalating demands of new entrants in the space domain, and the smaller satellites, different orbits and new capabilities they will require. As always, Aerospace is prepared to meet or exceed those challenges.

Artificial intelligence and machine learning can be used to monitor continuous video of a parking lot to provide security and detect suspicious activity.

***“No one who knows what we have in space today would trade our defense and intelligence architecture with anyone on the planet.”***

***– General David L. Goldfein,  
U.S. Air Force Chief of Staff***



An aerial photograph of a parking lot filled with cars. The cars are arranged in rows, with some rows containing more cars than others. The colors of the cars vary, including white, grey, black, red, and blue. A central text overlay is present, featuring a dark background with orange and white text. The text is arranged in a title and two paragraphs. The overall scene is a top-down view of a parking area, likely used for a security or surveillance demonstration.

## ***Innovation for the Warfighter: Artificial Intelligence Gets Ahead of the Threats***

Modern computers process information in a way that looks remarkably human. Aerospace has been exploring how the latest advances in artificial intelligence (AI) and machine learning can be used to enhance space capabilities and protect assets from malicious threats.

A recent effort combined machine learning with machine vision to create a system that could autonomously review video footage and detect patterns of activity. In one test case, the system monitored video of a parking lot and identified moving cars and pedestrians. The system established a baseline of normal activity from which anomalous and suspicious actions could be detected.

AI excels at sifting through mountains of data and finding variations that would escape human notice. Aerospace is exploiting this advantage to identify anomalies in the telemetry signal for batteries on orbit, detecting long-term trends that might not be obvious to an operator. Similarly, Aerospace is using machine learning to analyze

*Aerospace has been leveraging the latest advances in artificial intelligence, cloud computing, and machine learning to improve and protect space capabilities.*

rocket engine performance, automatically alerting analysts when a new dataset deviates from expected values. Researchers are also refining a powerful software program that can detect anomalies at rates and scales required for real-world applications; the program was recently used to spot anomalies in five years' worth of telemetry data generated by operational AeroCube satellites.

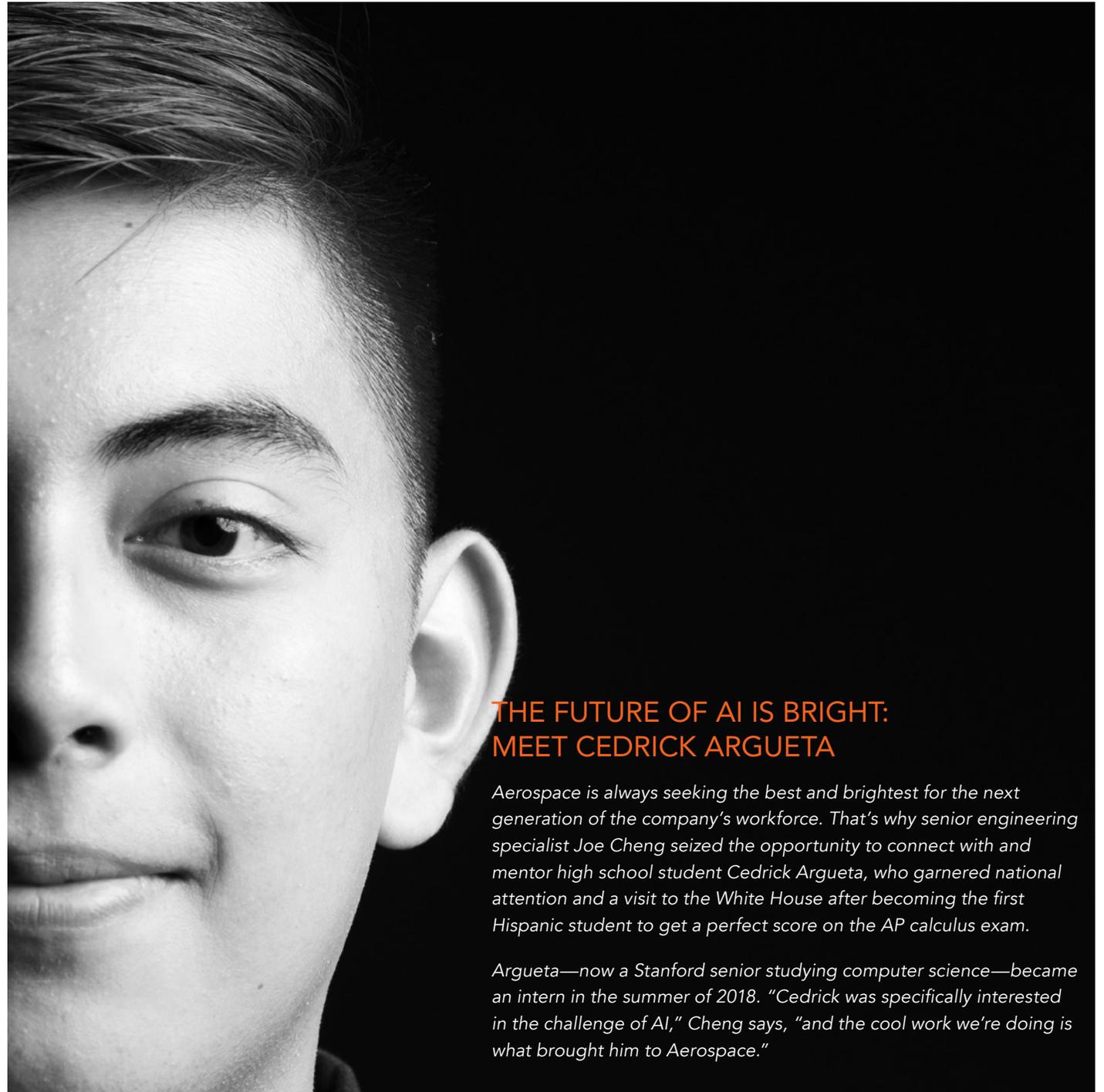
Another intriguing project seeks to infuse AI into a simulation framework using "reinforcement learning," whereby a program is "rewarded" for making good decisions. A related initiative is using reinforcement learning for path planning and navigation in robots operating in the physical world.

Aerospace is also applying AI to keep pace with advances in manufacturing. For example, researchers are working to combine machine learning with nondestructive evaluation of additive manufacturing with the goal of verifying fabrication quality while parts

are being built, eliminating the need for manual inspection. Machine learning has also been used to automate imagery analysis, greatly reducing the manual processing needed and achieving more consistent results.

Aerospace researchers recently took first prize in the Army Rapid Capabilities Office Blind Signal Classification Challenge, applying AI and machine learning to analyze unknown radio frequency signals. The methods devised at Aerospace could ultimately assist electronic warfare officers on the battlefield.

Another effort is applying text analytics and machine learning to help program offices evaluate contractor data during program design reviews. The innovative technique could have major ramifications for the acquisitions process.



## THE FUTURE OF AI IS BRIGHT: MEET CEDRICK ARGUETA

*Aerospace is always seeking the best and brightest for the next generation of the company's workforce. That's why senior engineering specialist Joe Cheng seized the opportunity to connect with and mentor high school student Cedrick Argueta, who garnered national attention and a visit to the White House after becoming the first Hispanic student to get a perfect score on the AP calculus exam.*

*Argueta—now a Stanford senior studying computer science—became an intern in the summer of 2018. "Cedrick was specifically interested in the challenge of AI," Cheng says, "and the cool work we're doing is what brought him to Aerospace."*



*Dr. Terence Yeoh and Dr. Nehal Desai can apply their AI algorithm to specific environmental factors to create solutions for ecological and conservational issues.*

## **AT WORK ON A THINKING AND DREAMING AI**

*Among the Aerospace experts focusing on AI are Dr. Terence Yeoh and Dr. Nehal Desai, who are spearheading a project that promises to accelerate the understanding and adoption of AI technologies.*

*The project, launched as part of the XPRIZE competition, focuses on designing an AI that can dream—meaning it is a machine learning system that can learn and provide plausible solutions with very little initial information.*

*For example, Yeoh and Desai are using the AI algorithm to address the problem of illegal poaching—not just how to locate and intercept the poachers, but how to analyze the economic incentives that provide benefits to the poachers. It then “dreams” up solutions to stop the poaching and provide replacement income to the poachers, such as establishing an ecotourism industry, which works only if there are thriving endangered species in the area.*

## **Strengthening the Nation's Response to Threats**

If it seems that the threat environment is changing faster than ever before, that's because it is. With a combination of speed, vision, and innovation, Aerospace is helping its government customers adopt a more resilient posture—one that does not simply react to emerging threats, but actively predicts and negates them.

Bold CubeSat missions and concepts such as the Optical Communications and Sensor Demonstration and Rogue-1 are opening new possibilities in responsive and reconfigurable space architectures. Proactive initiatives to build consensus in space traffic management and debris mitigation will help ensure unrestricted space access despite the proliferation of commercial space ventures. Unheralded efforts in space cyber will add an extra layer of protection to vital warfighter assets.

Speed is critical, in terms of testing new technologies, fielding new hardware, and structuring program acquisitions. Aerospace is adapting its renowned mission assurance approach to better balance

the competing demands for agility and risk reduction across the full range of mission classes, including review and certification of new and reusable rockets such as the Vulcan, Falcon 9, and New Glenn. Strategic partnerships are essential to creating a comprehensive and interconnected space enterprise, and Aerospace is uniquely positioned to connect forward-thinking government program managers with successful innovators in the commercial sector. Looking beyond space, Aerospace has also been applying its technical savvy to help shore up the nation's nuclear deterrent and missile defense capabilities.

Aerospace has an extensive history in complex space systems—but the corporation's true legacy has always been in anticipating new threats and opportunities, fostering positive change, advancing the technical state of the art, and devising innovative and effective solutions to the nation's most pressing engineering challenges. By focusing on what's most important, Aerospace proudly demonstrates its value to the nation every day.

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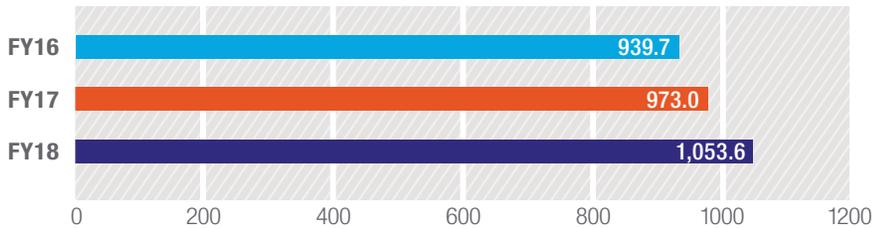


**Dr. Sherrie L. Zacharius**  
Vice President,  
Technology and  
Laboratory Operations

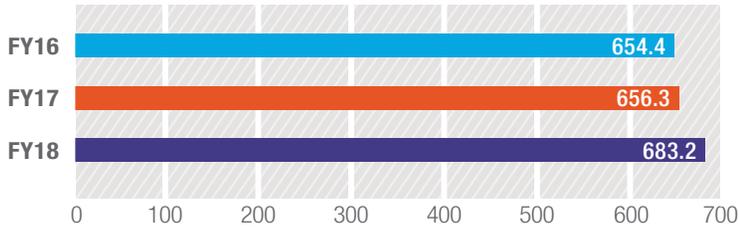
# Aerospace by the Numbers

## FINANCIAL DETAILS\*

TOTAL REVENUE (\$ IN MILLIONS)



TOTAL ASSETS (\$ IN MILLIONS)



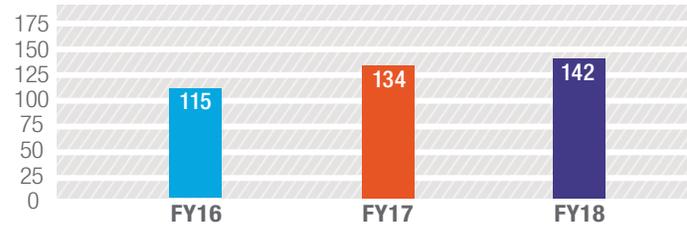
**4,000**  
Employees

**75% TECH STAFF**

**Almost 800 Ph.D.s**

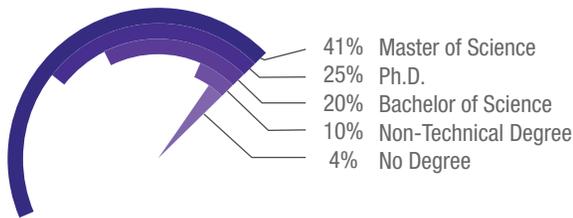
## INTERNAL TECHNICAL INVESTMENT TRENDS

TOTAL STE

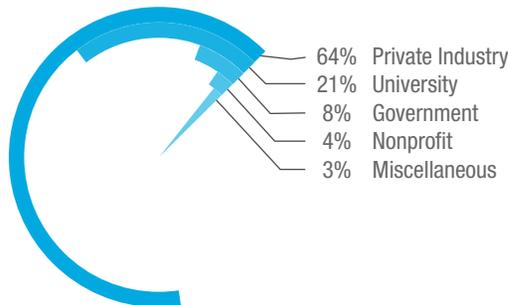


## TECHNICAL STAFF DETAILS

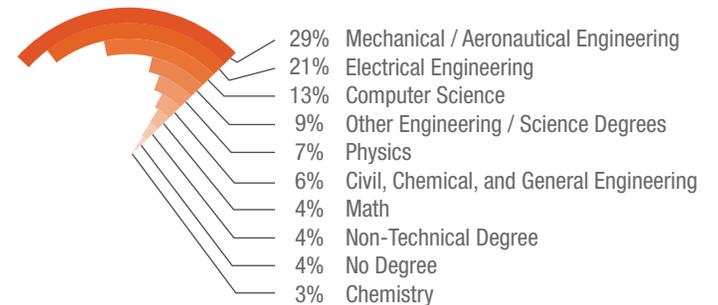
DEGREES OF TECHNICAL STAFF



PREVIOUS AFFILIATIONS OF TECHNICAL STAFF



DISCIPLINES OF TECHNICAL STAFF



\*2018 unaudited. The corporation's independent auditor is Deloitte. For a copy of The Aerospace Corporation's audited financial statements, please request via email at CFO@aero.org.

## Awards and Recognition

### *The Aerospace Corporation Corporate Awards*

- Trustees' Distinguished Achievement Award – Electrical Power System Team of Dr. Kasemsan Siri and Michael Willhoff
- President's Distinguished Achievement Award – Mark Nelson and Dr. Christopher Ranieri
- Program Recognition Award – Civil Weather Systems Program Office
- Innovation Award – Watcher Team of Daniel Balderston, Kenneth Lau, Michael Kaiser, and Aaron Myrick
- Aerospace Team of the Year Award – Spectral Sensor Development Team
- Excellence in Diversity Award – Peggy Tatum
- Office Professional Recognition Award – Elaine Young

### *National Aeronautics and Space Administration (NASA)*

- Group Achievement Award – OSIRIS-REX Mission Team member, Dr. Dolan Highsmith
- Group Award – Dr. Dolan Highsmith
- GOES-R Flight Project Significant Achievement Award – Aerospace's GOES-R Image Navigation and Registration (INR) Support Team, Scott Houchin, Dr. Brian Porter, Dr. Philip Slingerland, Dr. Peter Isaacson, Charles Fink, Thomas Grycewicz, Christopher Folley, Patrick Johnson, Donald Rudy, Pradeep Thiyanaratnam, Evan Haas, Frank De Luccia, Gabriel Moy, and Justin Graybill
- Geoint Award Certificate – Robert Markin

### *National Oceanic and Atmospheric Administration (NOAA)*

- Flight Project Significant Achievement Award – GOES-16 Image Navigation and Registration Team, Frank De Luccia, Charles Fink, Christopher Folley, Justin Graybill, Thomas Grycewicz, Evan Haas, Scott Houchin, Dr. Peter Isaacson, Patrick Johnson, Patricia Maloney, Gabriel Moy, Brian Porter, Donald Rudy, Dr. Philip Slingerland, and Pradeep Thiyanaratnam

### *National Reconnaissance Office (NRO)*

- Customer Eagle Award – Leon Gurevich

### *Department of the Air Force*

- Mission System Team Excellence Award – GPS MGUE Platform Integration Team of Steven Hubble, John Janeski, Deepti Kannapan, and Robert Wong
- Commendation letter – Alberto Arredondo, Brian Brenner, Tiange Fan, and Eric Lai

### *National Nuclear Security Administration (NNSA)*

- NNSA Defense Programs Award of Excellence – Dr. Susan Wilkerson and Dr. Robert Luter

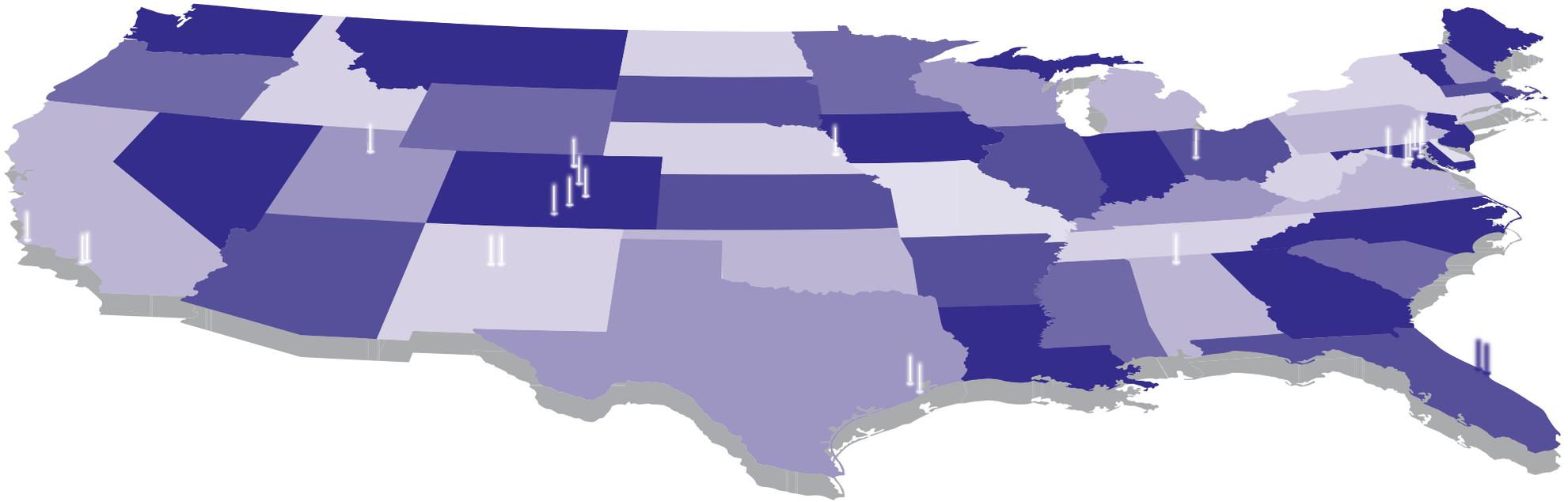
### *Air Force Space and Missile Systems Center*

- Directorate's Team of the Quarter – Eva Allen-Neldner, Valerie Ang, Henry Bazak, John Burke, Emily Dimpfl, Mark Doan, Matt Eby, Jacob Everist, Greg Fruth, David Gilmore, Brian Gore, Leon Gurevich, Dwain Harris, Randy Hicks, Garry Jared, David Johnson, Brian Kimsey, Leon Lala, Dr. Demyan Lantukh, Walter Lillo, Darin McNeal, Nasir Muhammad, Mark Mueller, Naoki Oishi, Mark Oleksak, Ghanshyam Purohit, Dr. Chris Ranieri, Geoffrey Reber, Brandie Rhodes, Andy Rowland, Aaron Schutte, Bill Slutter, Jordan Smiroldo, Yvette Smith, Rostislav Spektor, Stephen Spry, Dr. Davin Swanson, Christina Tan, Bill Tighe, Sonny Yi, Albert Yu, and Paul Zacks

### *International Council on Systems Engineering (INCOSE)*

- 28th Annual International Symposium Best Paper Award – Dr. James Martin
- Board of Directors – Dr. Mark McKelvin elected vice president

## Locations



### **California**

- El Segundo (corp. HQ)
- Pasadena
- Vandenberg Air Force Base

### **Virginia**

- Arlington
- Chantilly

### **Colorado**

- Buckley Air Force Base
- Colorado Springs
- Denver
- Peterson Air Force Base
- Schriever Air Force Base

### **Alabama**

- Huntsville

### **Florida**

- Cape Canaveral  
Air Force Station
- Kennedy Space Center

### **Maryland**

- Columbia
- Goddard Space Flight Center
- Silver Spring
- Suitland

### **Nebraska**

- Offutt Air Force Base

### **New Mexico**

- Albuquerque
- Kirtland Air Force Base

### **Ohio**

- Wright-Patterson  
Air Force Base

### **Texas**

- Houston
- Johnson Space Center

### **Utah**

- Hill Air Force Base



