NEW SPACE NEW MEXICO

THE FUTURE IN SPACE IS IN NEW MEXICO

REPORT – FEBRUARY 2019

NEW SPACE
NEW MEXICO

THE FUTURE IN SPACE IS IN NEW MEXICO

A study of the emerging space opportunity for New Mexico

GROW New Mexico's space industry through public/private partnerships
EXPAND New Mexico's existing space industry through new opportunities
ATTRACT space industry players to New Mexico

Goals:

- Increase private and government investment in space in New Mexico
- Broaden New Mexico space business opportunities
- Expand the available NM space workforce to meet emerging space tech needs
- Create a bigger voice for Space in NM

TABLE OF CONTENTS

NEW SPACE NEW MEXICO LEADERSHIP

New Space NM Executive Committee

Casey Anglada DeRaad – President, DeRaad Tech Connections, New Space NM Lead
Peter Wegner – CTO, Spaceflight Industries, New Space NM Executive Committee Co-Chair
Brad Clevinger – President, Solero Technologies, New Space NM Executive Committee Co-Chair
Kevin Yearout – President, Yearout Mechanical, New Space NM Operations Support
Dale Dekker – Founding Partner, Dekker/Perich/Sabatini, New Space NM Opertations Support
Kelli Cooper – Vice President, Albuquerque Community Foundation, Fiscal Agent

Members:
Bill Woldman – Field Representative, US Senator Udall
Michael Sullivan – State Director, US Senator Heinrich
Mariana Padilla – District Director, Congresswoman Lujan Grisham, recently appointed Children's Cabinet Director, Office of the Governor
Patrick Duran – Field Representative, US Congressman Lujan
Synthia Jaramillo – Director of Economic Development, City of Albuquerque
Matt Fetrow – Director, AFRL Tech Engagement
Christos Christodoulou – Dean, School of Engineering
Craig White – Dean, UNM Anderson Business School
Debra Inman – VP, Albuquerque Economic Development
Dan Hicks – Executive Director, Spaceport America
Malini Hoover – CEO, AOT and President, Professional Aerospace Contractors Association
David Campbell – Director of Planning, City of Albuquerque
Eric Renz-Whitmore – Community Engagement, City of Albuquerque

Thank you to our sponsors!

The initial phase has been supported with an Albuquerque Community Foundation grant funded by a group of public and private collaborators. Thank you sponsors!

- New Mexico Gas Company
- Albuquerque Community Foundation Great Grant Giveaway
- City of Albuquerque Economic Development Department
- State of New Mexico Economic Development Department
- Yearout Mechanical
- Dekker/Perich/Sabatini
- Cinco Amigos
- AON Corporation
- Air Force Research Laboratory

New Space NM Advisory Team

Thanks to the large community of supporters that joined us!

Space industry representatives, Albuquerque Community Foundation, Spaceport America, State Economic Development Department, City of Albuquerque Economic Development and Planning Departments, Albuquerque Economic Development, Bernalillo County Economic Development, Mid-Region Council of Governments, US Congressional NM Delegations, Air Force Research Laboratory, Space Rapid Capability Office, Space & Missiles Center/AD, Sandia National Laboratories, Los Alamos National Laboratory, NASA WSTF, White Sands Missile Range, CNM, New Mexico State University, Arrowhead, New Mexico Tech, University of New Mexico, COSMIAC, Thunderbird Kirtland Dev, Yearout Mechanical, Dekker/Perich/Sabatini, Albuquerque Journal, Business First, PACA, NM Trade Alliance, ABQ ID, ISPCS, Bridge of Southern NM, Mesilla Valley Economic Alliance, NM Tech Council, NM Space History Museum, and NM Space Festival.

Special thanks to Holly Twitchell, Mike McDuffie and Michelle Urban for editing and graphics.

EXECUTIVE SUMMARY

Why space? Why New Mexico?

Commercial space market opportunity – The global space economy is estimated to grow to $3T over next 20 years!

New Mexico is uniquely positioned to lead, having industry, Spaceport America, government thought leaders, investment and intellectual capital ready!

New Mexico can capture this opportunity and be a leader in commercial space by implementing the New Space NM strategy recommendations!

The goal of this report is bring together and educate the New Mexico space stakeholders of the opportunity: the commercial space market is booming with private investment and ground breaking innovations and New Mexico is uniquely positioned to leverage its many assets as a platform to launch. There is an emergent need to move on the strategy recommendations to take advantage of this opportunity and become a lead state in space!

Over the past year, the New Space NM public-private partnership has worked with over 200 space industry stakeholders to study and educate leaders on the space industry market opportunity, highlight the many New Mexico space assets, and develop recommendations to grow, expand and attract the New Mexico space industry. The intent of the effort has been to inform and motivate stakeholders to act and to maximize economic growth and development in the space industry and increase prosperity for the New Mexico workforce, entrepreneurs, and other public and private entities.

The New Space NM strategy recommendations include the following:

- Stand up the New Mexico Space Council to bring together the space stakeholders to have a bigger voice and to develop a coordinated strategy for state and national-level advocacy and marketing;
- Establish a Space Business Connector to connect space companies to key resources and New Mexico assets;
- Develop a Workforce Connector to help connect employers, job seekers and students as well as establish initiatives to grow the high-tech workforce, such as a space industry internship program;
- Establish a public-private space investment fund to support attracting new space companies and expanding existing New Mexico space companies.

We have a great start with the establishment of the New Space NM Advisory Team of over 200 members from industry, private and public offices ready to engage. New Space NM will continue to work with this motivated group of leaders to implement the recommendations to support the growth of the space industry in New Mexico. New Mexico can be the leader in the commercial space market!

NEW SPACE NM OPPORTUNITY – WHY SPACE? WHY NOW?

Introduction

In a recent Merrill Lynch report, the global space market is expected to grow from $339B in 2016 to $2.7T by 2045.[1] This estimated growth is due in large part to private investments in launch, satellite manufacturing, satellite services and ground equipment innovations.

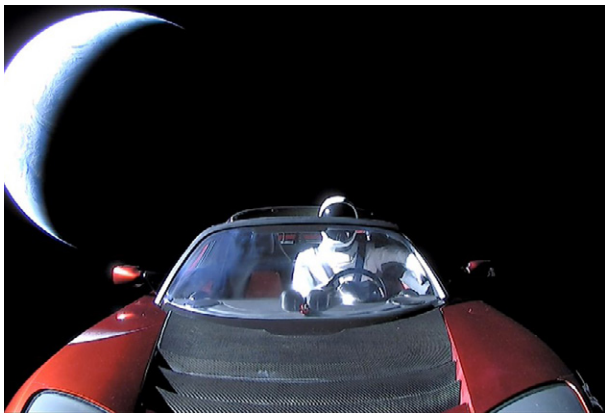
Historically, investment in the space industry was made primarily by the government and telecom industries. Since 2009, commercial entities such as, Space X, Blue Origin, and Virgin Galactic have made major contributions to innovations in commercial space industry. These innovations have enabled a significant pivot for private and government space activities.

New Mexico is already an important part of this transformation with its assets ranging from key government investments and infrastructure to a diverse space industry to a world–class intellectual capital pool. New Mexico's industry sweet spot is satellite manufacturing, but with a concerted effort, New Mexico can grow in the space–derived software applications and other growing sectors of the space industry. New Mexico is uniquely positioned to take advantage of this tremendous opportunity to become a leader in the growing commercial space industry.

What is space?

Space includes all public and private actors involved in developing, providing, and using space–related products and services, including: manufacture and use of space infrastructure (ground stations, launch vehicles and satellites), space–enabled applications (navigation equipment, satellite phones, meteorological services, etc.), and the scientific research generated by such activities. It follows that the space economy goes well beyond the space sector itself, since it also comprises the increasingly pervasive and continually changing impacts of space–derived products, services, and knowledge of the economy and society. Bank of America, Merrell Lynch study reports, "Space represents one of the final frontiers of investing and is currently experiencing an innovation–driven paradigm shift, both from within and outside the space domain."[2]

Space is a hotbed for disruptive technologies that stretch the boundaries of human engineering. We already greatly benefit from satellites where we interact with them numerous times per day in today's tech–driven society for everything from video/voice calls, inflight WiFi, navigation, and driverless cars to weather monitoring. Space provides many opportunities to support Earth's environmental and social challenges via satellites, such as providing Internet access to rural areas or monitoring water quality, climate, and land changes. These



1 *Merrill Lynch – Bank of America Thematic Investing To Infinity and Beyond – Global Space Primer 30 October 2017*

2 *Merrill Lynch – Bank of America Thematic Investing To Infinity and Beyond – Global Space Primer 30 October 2017*

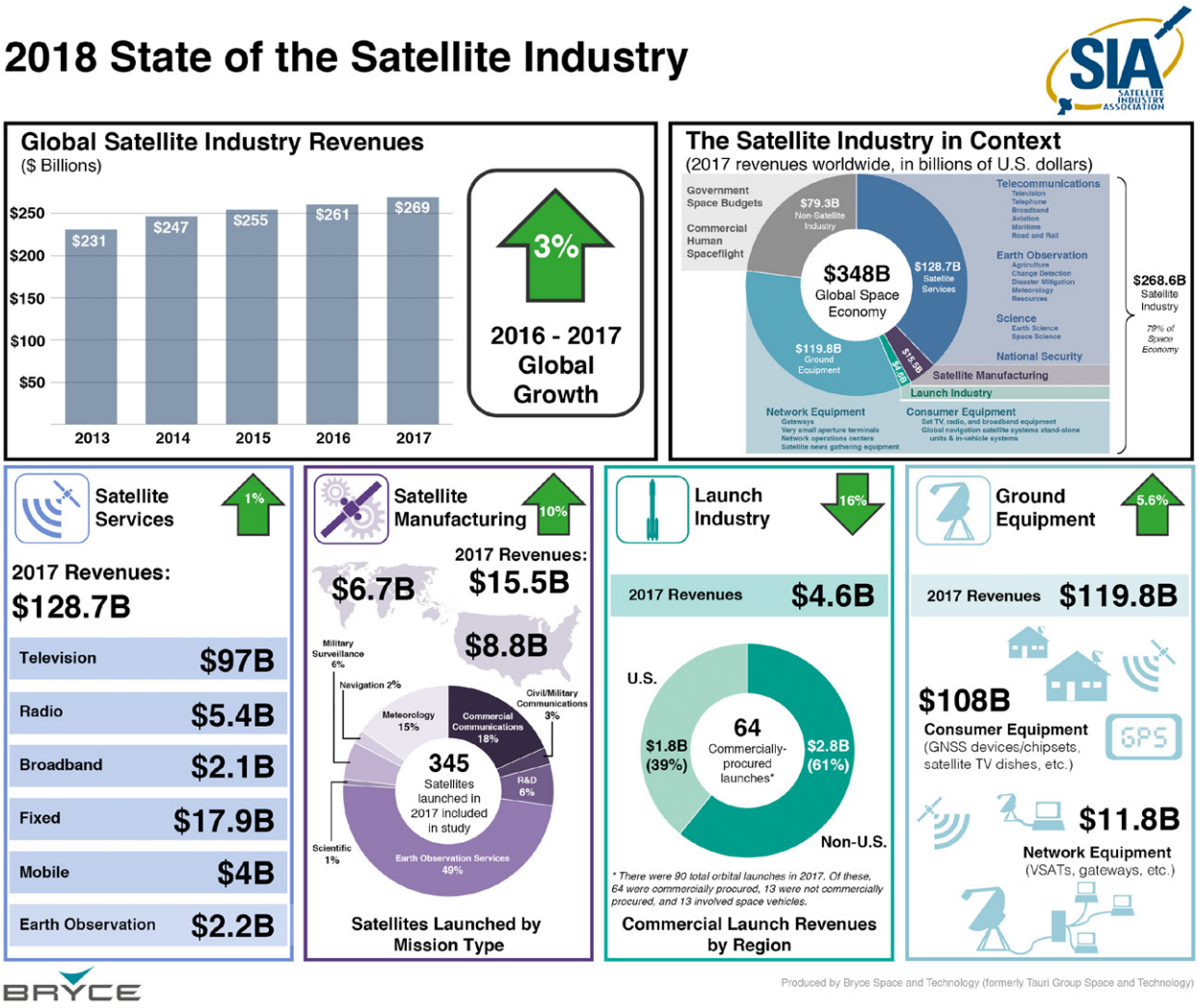


Figure 1 *2018 Satellite Industry Association's State of the Satellite Industry Report*

applications can open up a world of opportunities for new and current New Mexico companies to take advantage of developing space derived products. The following are a few examples of downstream applications made possible by space: communications, connected devices of the future, such as self–driving cars, agricultural prediction, transportation monitoring and more.

The Growing Space Revenue

As of 2017, the Satellite Industry Association reports the global space economy reached $348B.[3] In Figure 1, the Satellite Industry Association 2018 report shows this growth due in large part to satellite manufacturing, satellite services, and ground equipment. The latter two categories are where the major commercial investments are compared to satellite manufacturing and launch.[4]

3 *2018 Satellite Industry Association's State of the Satellite Industry Report*

4 *2018 Satellite Industry Association's State of the Satellite Industry Report*

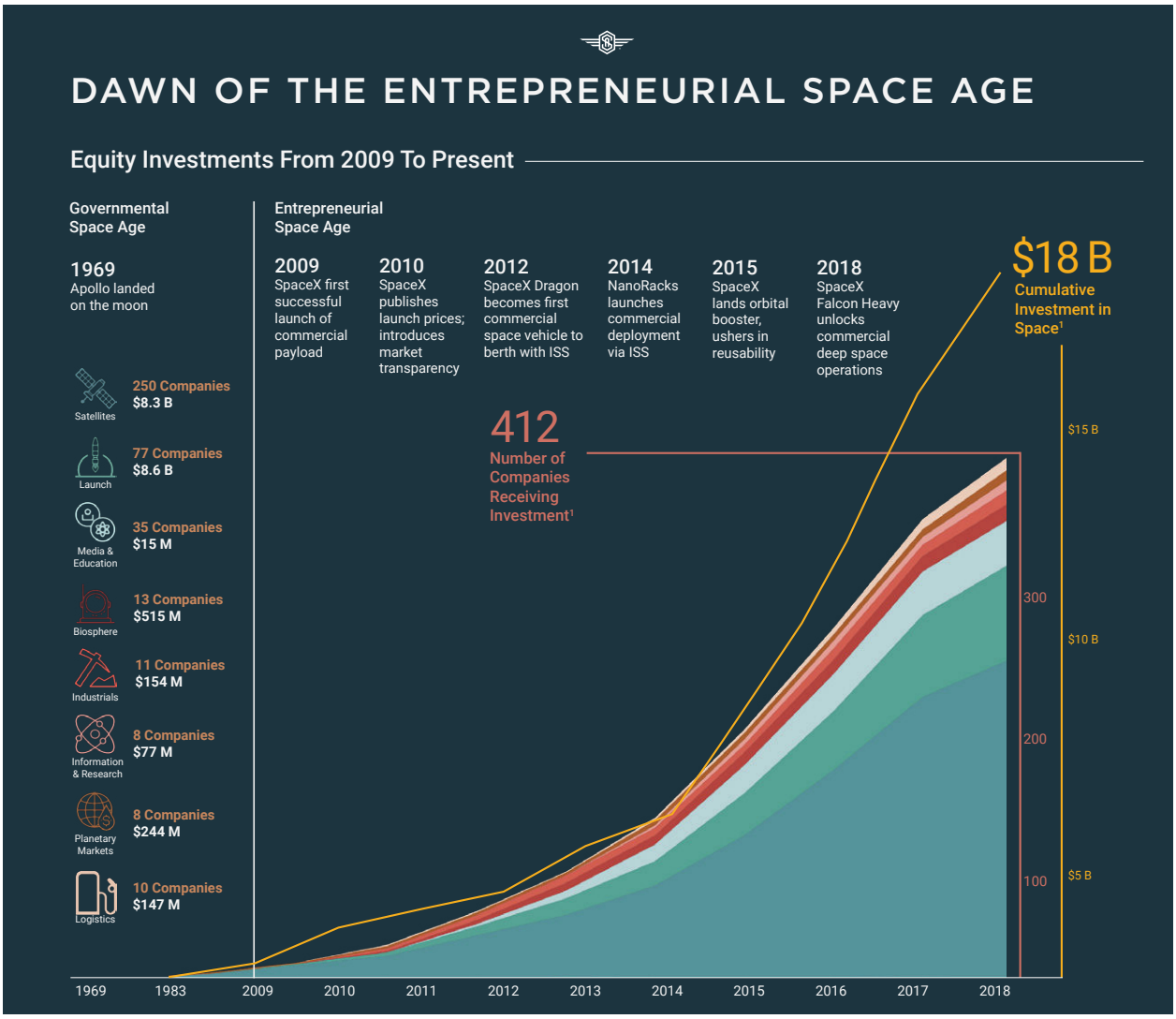


Figure 2 *Equity Investments from 2009 to Present*

According to Space Angels Holdings, from 2009 to Q3 2018, investors funded $16.1 billion into the commercial space industry as shown in Figure 2.[5] Before this growth in private space investment, space revenues were made up primarily from government and telecom industries. These innovations have enabled a significant pivot for private and government space activities.

The Space Innovation Pivot

The global space economy growth is due in large part to private investments in launch, satellite manufacturing, and satellite services innovations and derived from the demand to data–centric applications with telecom as the industry driver.

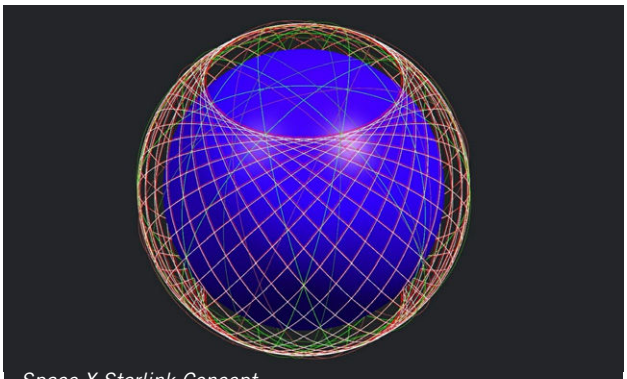
The earlier space landscape, with government and telecom investment, was decorated with large satellite systems that were expensive, took years to develop, test, and launch. These large satellites

5 *Space Angels Space Investment Quarterly Q3 2018*

were contracted out to only a few large prime contractors. Small and medium companies in the space industry generally had to work through the large primes as subcontractors.

The demand for faster data rates is driving the telecom industry to move from digital TV to data centric services, such as the advent of internet steaming services such as Netflix. The commercial space industry is moving from large, expensive, uniquely–designed satellite systems in Geostationary Earth Orbit (GEO), 22,000 miles away from Earth, to Low Earth Orbit (LEO) 500–1,000 miles from Earth, and has given smaller companies more opportunity to participate directly. As a result, new telecom satellite solutions are being funded for larger numbers of smaller satellites set up in groups or constellation architectures in LEO, enabling fast data speeds and full service coverage.

In September 2018, AT&T reported record–level subscriber loss for Direct TV, while at the same time reporting increased revenues and profitability in streaming services.[6] The increased need for data streaming services is apparent in many other applications such as maritime, aeronautical, Internet of Things (IoT), and more leading the expectations for this market growth opportunity.



Space X Starlink Concept

In November 2018 the Federal Communications Commission (FCC) approved Space X to launch over 11,000 satellites to provide broadband services. This will be a worldwide network that will provide Internet access to every square inch of the globe.

The large growth in the commercial market is being driven by this shift to direct–to–consumer services. Smaller satellites are being developed due to this shift, leading to a fundamental change in the value stream. What is a relatively small industry today is poised to bring the space economy into the lives of half the planet on a near constant basis through deployment of large Internet–providing fleets to the population currently without Internet.

Internet of Things enabled by space

6 https://www.cnbc.com/2018/10/24/att-earnings-q3-2018.html

The introduction of these small satellites has also enabled a pivot for leaders in national security space who are looking to leverage commercial investment and use of small satellites because they can be rebuilt more quickly and are more resilient to possible threats. General Hyten, Commander, U.S. Strategic Command, favors constellations (groups) of cheaper, smaller satellites that would be harder to take down and easier to reconstitute. He has called on the Department of Defense (DoD) to embrace faster–paced developments and uses of commercial technology such as small satellites that can be launched quickly, replaced if attacked, and are more resilient.[7]

"How do we structure ourselves so that the technological advances pouring out of the private sector can spin on to Air Force requirements?"

– Heather Wilson, Air Force Secretary

Both commercial entities and the DoD are attracted to the smaller satellite constellation architecture for different reasons. One for faster data speeds and the other for the resiliency options delivered. In either case, the US government is looking to leverage the innovations in the vast commercial space investment. Many of the same manufacturing capabilities can address the needs of both, allowing new players to enter the mix.

Summary

The commercial space sector is booming with new sources of venture capital that are financing the development of more affordable launch systems, small satellite constellations, and new services and products derived from emerging lower–cost space–based systems.[8] We are on the cusp of a new Space Age that anticipates more advances in the next few decades than we have seen since the launch of Sputnik in 1957. New Mexico is uniquely positioned to lead by leveraging its vast assets and moving forward on a strategy to grow, expand, and attract the commercial space industry.

Spacelight Industries successfully launched 64 customer spacecrafts to orbit on December 3, 2018 on Space X Falcon 9 launch vehicle

7 *Berger, Eric. Key US General Embraces New Space Ethos of "Go Fast, Test, and Fail." Ars Technica. June 21, 2017. https://arstechnica.com/science/2017/06/key-us-general-embraces-new-space-ethos-of-go-fast-test-and-fail/*

8 *Goldman Sachs 2017 Research briefing on space, Equity Research, April 4, 2017*

NEW MEXICO IS UNIQUELY POSITIONED TO MEET THE SPACE GROWTH OPPORTUNITY

New Mexico is ready to launch:

- **Intellectual capital**
- **New Mexico space industry**
- **Spaceport America**
- **DOD contract dollars**
- **NM Military thought leaders in space: Space RCO, AFRL, SMC**
- **Secure facilities and equipment**
- **Intellectual property and technology**

New Mexico is poised to capture this growing commercial space industry by launching from the assets already in the state. The following highlights the New Mexico space assets to leverage to grow the space industry. See "New Mexico's Space Profile" for a more detailed outline of the New Mexico space assets.

New Mexico space companies serve different applications and range in size from large prime contractors to innovative high–tech startups some of which have started via government contracts. Many new companies are starting every day with private investment, such as Descartes Labs and Solstar. New Mexico has over 60 companies working in the space industry.

Many of the space companies' workforce needs are in STEM (Science, Technology, Engineering and Mathematics) career fields. New Mexico has one of the highest percentages of STEM workforce due to our long history as a world–class research center having several federal and private sector research institutions. In fact, Livability, an online magazine, ranked Albuquerque, New Mexico's largest city, fourth of 2018's 10 Best Cities for STEM Workers. This was determined from three data points from over 2,000 cities: the share of total jobs that fall into the STEM category, median income for STEM jobs, and median income for STEM jobs in relation to the overall median income for the city. Albuquerque has the most STEM jobs of any other city on the list at 22,000, which offer a median salary of $81,617.[9] The combined number of employees for Air Force Research Laboratory, Los Alamos National Laboratory and Sandia National Laboratories alone is over 21,000. This does not include the tech companies and other military and government organizations. New Mexico's workforce is also diverse as a majority–minority state with over 45% Hispanic and 5% Native American populations. The intellectual capital available with the STEM focus and the diversity will support inclusively growing the New Mexico space industry to be a more innovative and robust economy.

New Mexico also has three key Air Force organizations that work in space operating at Kirtland Air Force Base (KAFB) in New Mexico: Space Rapid Capabilities Office (Space RCO), Air Force Research Laboratory (AFRL), Space and Missiles Center (SMC) with over $900M in annual funding and over 1600 employees. These Air Force organizations are at the center of the National Space discussions to embrace faster–paced developments and uses of commercial technology.

New Mexico is home to two Department of Energy (DOE) world–class laboratories: Sandia National Laboratories (SNL) and Los Alamos National Laboratory (LANL) – both supporting space and leading to vast intellectual capital, investment spending, and technology partnerships with over $5B in annual funding.

9 https://livability.com/top-10/culture/10-best-cities-for-stem-workers/2018/nm/albuquerque

New Mexico has a favorable business environment with many training and tax incentives for companies to locate to the state. Kiplinger calls New Mexico the 8th most friendly tax climate.[10] New Mexico's quality of life dynamics confer real and tangible benefits on employers in the state; helping to maximize productivity, minimize cost, and enhance workforce stability. "When Ajay Royan of Mithril Capital, an investment fund, asks rhetorically "How are you supposed to have a startup in a garage if the garage costs millions of dollars?", speaking of the highest cost of living in America in the San Francisco Bay Area in which Silicon Valley sits. A median–priced home costs $940,000 and the Department of Housing and Urban Development considers a family earning less than $120,000 in San Francisco "low income".[11] A median–priced home in New Mexico, on the other hand, costs $187,100 and the cost of living in Albuquerque, NM (which holds 25% of the state's population) is 5% below the national average.)[12]

Overall, the quality of life New Mexican's partake in is an attractive feature for motivating businesses to locate to the state. We have a strong presence in the following industries: aerospace and defense, advanced manufacturing, data centers, value–added agriculture, logistics and distribution, technology commercialization, energy and renewable resources, and digital media.

Many who call New Mexico home seek out its scenic beauty and year–round outdoor recreation activities including: world class whitewater rafting, fly fishing, kayaking, golfing, hiking, rock climbing, mountain biking, skiing, snowboarding, ballooning, wind surfing, cycling and even scuba diving. Additionally, residents and visitors will find a vast array of microbreweries, wineries, and award–winning food to enjoy after the workday is done. New Mexico is well positioned to lead in the new commercial space industry, and has the opportunity to capture some of the high tech companies with our many space assets as well as our favorable quality of life dynamics.

10 https://gonm.biz/why-new-mexico/

11 *The Economist, Techsodus Silicon Valley is changing, and its lead over other tech hubs narrowing Sep 1st 2018*

12 https://www.bestplaces.net/cost_of_living/state/new_mexico
https://www.payscale.com/cost-of-living-calculator/New-Mexico-Albuquerque

STRATEGY RECOMMENDATIONS

Over the past year, the New Space New Mexico public–private partnership has worked with space industry stakeholders to educate leaders on the space industry market opportunity and develop recommendations to grow, expand and attract the New Mexico space industry. As part of this process, the space related assets of the state have been highlighted and are outlined in detail in the New Mexico Space Profile section of this report. The New Space NM Advisory Team was established with over 200 members from industry, State of NM Economic Development, City of Albuquerque, Air Force, NM universities and CNM, Spaceport, ACF and AED non–profits and many more.

As part of our efforts to pull the stakeholders together, the question, "What do you wish the New Mexico space ecosystem was doing for you?" was asked of the members. Below are some excerpts from the space industry members. From the inputs received from the space industry, the New Space NM Executive Board and the New Space NM Advisory Team, four strategic recommendations were developed and are outlined below.

1. NEW MEXICO SPACE COUNCIL

Strategic Recommendation #1: Build a stronger voice for space industry in NM – Establish New Mexico Space Council

Goal 1: Establish NM Space Council with beginning membership from the New Space NM Advisory Team from initial study phase connecting all space sector stakeholders across NM. Leverage efforts and partner with Professional Aerospace Contractors Association (PACA), Aerospace States Association, and American Institute of Aeronautics and Astronautics (AIAA).

Goal 2: Develop New Space NM marketing campaign to attract participants to be part of the transformation; to communicate the aggregate NM capability and robust infrastructure; and to proactively appeal to data analytics and space–based applications companies.

Goal 3: Sponsor signature space events as well as recruiting events and networking opportunities.

Goal 4: Develop government advocacy strategy for space industry state/federal engagement.

Space Industry Feedback

- Provide a forum linking customers, investors, suppliers and producers.
- Bring space companies together to network but without the financial entry barrier to help facilitate teaming.
- Provide networking opportunities.
- Consolidate a depository of NM capabilities.
- Provide access to all the companies on the New Space NM website.
- Stop apologizing and start celebrating – publicize the top assets together.
- Pull together marketing materials we all can use for recruiting.
- Leverage New Mexico True marketing campaign.
- Host a signature space conference in NM.
- Provide a forum that the space industry can be heard at the state and federal levels.

2. NEW MEXICO SPACE BUSINESS CONNECTOR

Strategic Recommendation #2: Grow, expand and attract space companies – NM Space Business Connector

Goal 1: Establish a Space Company Business Connector to connect companies to people, tools, and resources; identify public–private capital and government contracting opportunities.

Goal 2: Be a hub/incubator for space companies to collaborate and accelerate technologies.

Goal 3: Leverage current economic support organizations, laboratory technology transfer programs and accelerators.

Space Industry Feedback

- Help streamline the setup and connections to the space ecosystem for the companies.
- Help to promote more permeability between the government labs and companies.
- Establish in Albuquerque an innovation and accelerator incubator similar to Colorado Springs' C–TRAC at Catalyst Campus. AFRL Space Vehicles has already used DIUX and Catalyst Campus. This could be particularly helpful to the emergent Space RCO.
- Connect companies with other community leaders to identify what the city, county and state can do to improve the general ecosystem to help space businesses grow in NM (policies, tax incentives, scholarship/fellowship programs, etc).

3. NEW MEXICO SPACE WORKFORCE CONNECTOR

Strategic Recommendation #3: Develop a New Mexico Space Workforce Connector to support and generate the high–tech space workforce.

Goal 1: Establish and expand space industry internship and apprenticeship programs.

Goal 2: Establish strategy to support/grow companies owned by people of color – find ways to intentionally recruit, retain and promote diverse workforce.

Goal 3: Develop and maintain a workforce platform for connecting employer, job seeker, student, NM alumni at all career levels.

Goal 4: Develop and sponsor recruiting events

Space Industry Feedback

- Help surface underutilized talent already grown and grow more employable, space talent.
- Identify and pair companies with compatible academic programs/students.
- Start a collaborative "work with industry" summer internship/fellowship program similar or an expansion of the AFRL scholars program.
- Share employment opportunities.
- Link employers to talent pool, both currently in workforce as well as the education pipeline.
- Look at other states successful workforce programs that attract alumni back.
- Help the graduating students from leaving by having the NM space Co's more connected and active on NM campuses.
- Host New Space NM recruiting events.
- Need workforce with clearances to speed up hires.
- Work at the state and federal levels to influence federal attention/resources required for approvals for clearances.
- Retired Veterans are great hires. NM is one of 8 states that taxes a veterans pension. It needs to change.

4. NEW MEXICO SPACE INVESTMENT FUND

Strategic Recommendation #4: Develop a Space Fund – Capital

Goal 1: Establish Public–private venture fund to accelerate the investment and growth of high performing space companies.

Goal 2: Establish a prototype funding line to prime company product development.

Space Industry Feedback

- Connect to more private funding opportunities.
- Support marketing efforts to help NM space companies get access to investment funding.
- Share contract funding opportunities.

NEW MEXICO'S SPACE PROFILE

NEW MEXICO'S SPACE PROFILE

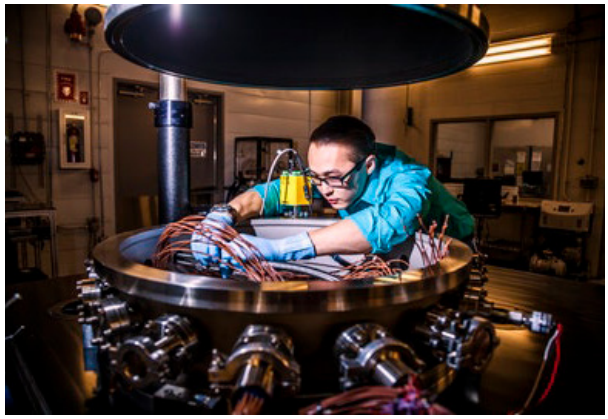
New Mexico has the ingredients to launch!

- New Mexico space industry
- Intellectual capital
- Spaceport America
- DOD space contract dollars
- NM Military thought leaders in space: Air Force Research Laboratory, Space & Missiles Center, Space Rapid Capabilities Office
- Secure facilities and equipment
- Intellectual property and technology

New Mexico Space Assets

Private Sector: New Mexico's Space Industry

New Mexico has a significant number of space companies that are diverse in space application areas, such as satellite component, design and manufacture, space launch, data analytics and services. Many have grown through government contracts, but new companies are starting every day in the



commercial space realm, such as Descartes Labs and Solstar. They are meeting the new demands and opportunities that the space industry holds. Figure 3 is a list of the space companies with a New Mexico Presence. There are over 60 companies with a New Mexico presence. There are also many companies ready to support the new space tourism, near space opportunities, and launch at Spaceport America.

Intellectual Capital

Though the space industry employs a broad spectrum of career areas at all levels, the majority of the space industry workforce comes from the STEM fields. Of the 2.2 million New Mexicans, 876,000 are in the civilian workforce, and of these, almost 36,000 are in the computer, mathematical, and engineering occupations.

With the many Department of Defense partners on Kirtland Air Force Base and Sandia National Laboratories, Albuquerque has attracted a number of technology companies to the region. Intel's manufacturing site has grown many STEM positions that has produced cutting–edge semiconductor products. Los Alamos National Laboratory has attracted a large number of STEM positions to New Mexico with its world–class science and technology.

New Mexico has one of the highest percentage of STEM workforce due to our long history as a world–class research center having several Department of Defense, Department of Energy and private sector research institutions. The combined number of employees for Air Force Research Laboratory,

New Mexico Space Companies

Over 60 companies with a presence in New Mexico

Advanced Optical Technologies
Aegis Technologies
Aerospace Corp
Aerotek
Applied Defense Solutions – L3
Applied Research Assoc.
ARES Corporation
Applied Technologies Assoc (ATA)
Ball Aerospace & Technologies Corp.
Belcan
Blacksky
Bluecom Systems
The Boeing Co
Cesaroni Aerospace
Descartes Labs
Engility
ERT Inc
ExoAnalytic Solutions
Fiore Industries Inc.
General Atomics Electromagnetic Sys.
General Dynamics Mission Systems
Goodman Technologies LLC
Harris Corp.
Honeywell
Jacobs Technology
Kane Robotics
Leidos
LoadPath LLC
Lockheed Martin Corporation
Metis Technology Solutions
MEI Technologies Inc.
Moog Space & Defence Group
NMSU Physical Science Laboratory
Northrop Grumman
NG-Innovative Systems (formerly Orbital ATK)
Novi LLC
OptiPulse
Overlook Systems Technologies
Peraton
Polaris Alpha, a Parsons Co.
Raytheon
RS21
Sierra Peaks
Silent Falcon
SK INFRARED LLC
SolAero Technologies Corp
Solstar Space Co
Spaceflight Industries
Stellar Science
Talon Technologies
TEAM TECHNOLOGIES INC.
Torch Technologies
TMC Design
Ultramain Systems Inc.
Universal Technology Corporation
Universities Space Research Association
Verus Research
Vibrant
Virgin Galactic
Vista Photonics, Inc.
White Sands Research and Developers, LLC

Figure 3 *New Mexico Companies working in the space industry*

Los Alamos National Laboratory and Sandia National Laboratories alone is over 21,000. This does not include the tech companies and all of the military and government organizations. The New Mexico research universities, New Mexico State University, New Mexico Tech and the University of New Mexico grants over 1000 STEM degrees each year and have over a 40% minority graduation rate.

New Mexico is a majority–minority state with over 45% Latino and 5% Native American, and these populations are predicted to grow over the next 20 years. The intellectual capital available with the STEM focus and the diversity will support inclusively growing the New Mexico space industry to be a more innovative and robust economy.

New Mexico is located in the Mountain Division, which is experiencing the fastest rate of growth in the U.S. during the 21st century. Since 2000, New Mexico's population has grown by 31.3%, which is more than double the U.S. population growth. This growth is in large part due to people relocating from nearby western states such as California, Texas, and Arizona, but a large portion of people are relocating from much further with Florida, Virginia, Washington, and Illinois being among the top ten states of origin. New Mexico also continues to draw people in internationally with over 50,000 people having migrated to New Mexico from outside of the U.S. in the last five years. This has attracted companies around the world to locating in this region in order to take advantage of a growing and diverse workforce.[13]

Spaceport America

Virgin Galactic (VG) is planning to take tourists to space and Spaceport America has secured Virgin as an anchor tenant. VG's SpaceShipTwo has already succeeded in reaching an altitude of over 50 miles and is expecting that its first commercial suborbital flights will begin in 2019. Virgin Galactic has over 600 space enthusiasts signed up for its flights, at a cost of $250,000 per person. The flights will originate from Spaceport America, and VG has started moving its staff from Mojave to southern New Mexico.

Spaceport America, located in Southern New Mexico, is adjacent to the U.S. Army White Sands Missile Range (WSMR) and has already attracted some of the most respected companies in the commercial space industry: Virgin Galactic (its anchor tenant), United Launch Alliance (ULA), Boeing, UP Aerospace, EnergeticX, Pipeline2Space, and EXOS Aerospace.

Spaceport America's unique location offers multiple advantages to commercial space entrepreneurs seeking a location for engineering, manufacturing, testing, and launching:

- 18,000 acres in a remote, sparsely–populated area with optionally restricted airspace that minimizes public exposure and protects proprietary technology;
- 6,000 square miles of restricted airspace from surface to unlimited – above the White House is the only other location with unlimited restricted airspace in the US;
- A 12,500 foot runway;
- Excellent weather conditions, with low humidity that reduces corrosion – over 340 days of sunshine;

The Virgin Galactic SpaceShipTwo (Photographer: Chris Ratcliffe)

13 NM Partnership: https://nmpartnership.com/why-new-mexico/in-the-path-of-growth

- 4,600 feet closer to space! High desert elevation of 4,600 feet above sea level – increased payload capacity;
- Newly completed FAA–licensed horizontal and vertical launch areas;
- Affordable leases and reasonable fees for all users ranging from minimal support to maximum support, for those requiring a full suite of operational support;
- Campuses on both the north and east sides of the state that are open and site–ready for tenancy for flight test campaigns and innovative developments;
- Resident Level III security officers, emergency management & paramedic–qualified first responders;
- IT team available 24/7 to safeguard customer equipment and activities;
- Streamlined policies, capable in–house teams, and partnerships with U.S. Army White Sands Missile Range allows Spaceport America SA to meet unique demands and source equipment, materials, and capabilities on an á la carte basis at favorable rates;
- Optimally configurable transmitting/receiving stations throughout the 18,000 acres, benefiting from unobstructed low horizons and line–of–sight observations with available EM/RF spectrum
- Facilitated access to DoD frequencies as necessary, connections to ubiquitous, mobile high–bandwidth WiFi on–site, and leverage robust fiber backbone for dedicated external circuits at 1 GBPS and beyond.

Spaceport America is a world–class facility with significant capabilities for commercial space entrepreneurs. Coupled with the additional opportunities available through partnerships with New Mexico's universities, national laboratories, and military research facilities, Spaceport America provides a foundation for attracting the anticipated expansion of investment in aerospace and commercial space development to New Mexico.

Air Force

The DoD space budget is approximately $12B annually for unclassified systems. The three Air Force organizations at Kirtland – Air Force Research Laboratory (AFRL), Space and Missiles Center–Advanced Systems and Development Directorate (SMC/AD), and Space Rapid Capabilities Office (Space RCO)—in New Mexico are focused on national space and invest sizably in the national space industry sector with over $900M in annual funding and over 1600 employees. These Air Force organizations are at the center of the National Space discussions to embrace faster–paced developments and uses of commercial technology.

Space & Missiles Center – Advanced Systems and Development Directorate (SMC/AD)
$200M BUDGET | 740 EMPLOYEES
The SMC is the development center of the Air Force Space Command, and has its Advanced Systems and Development Directorate at Kirtland AFB in New Mexico. SMC is responsible for the Global Positioning System (GPS), military satellite communications, defense meteorological satellites, space launch and range systems, satellite control networks, space–based infrared systems and space situational awareness capabilities.

Space Rapid Capabilities Office – Space RCO
$298M BUDGET (FY19) | 50 CIVILIAN & MILITARY
The Space RCO is part of SMC and also located at Kirtland AFB in New Mexico. The Space RCO will be modeled after the Air Force Rapid Capabilities Office, which seeks to quickly develop and produce prototypes. The mission of the Space RCO is to (1) to contribute to the development of low–cost rapid reaction payloads, busses, launch, and launch control capabilities in order to fulfill joint military operational requirements for on–demand space support and reconstitution, (2) to coordinate the execution of space rapid capabilities across the DoD with respect to planning, acquisition, and operations; and (3) to rapidly develop and field new classified space capabilities. In light of the second mission area, the Space RCO coordinates across the DoD to achieve its mission. The Space RCO's physical footprint at Kirtland will likely be increased by as many as 75 military, civilian, and contractor personnel in the coming year.

New Mexico Research Laboratories

New Mexico has a rich environment for science, research, and technology commercialization not only through the universities, but also through its three federal laboratories, Air Force Research Laboratory (DoD), Los Alamos National Laboratory (DoE) and Sandia National Laboratories (DoE). Each of the laboratories have commercialization and economic development organizations to support the growth of the space industry. These organizations are highlighted in the New Mexico Tech Ecosystem section.

Air Force Research Laboratory (AFRL)
$384M BUDGET | 851 CIVILIAN & MILITARY
$276M CONTRACTS IN NM
AFRL is headquartered at Wright Patterson AFB in Ohio but has two directorates that support space research development at Kirtland AFB in New Mexico.
AFRL is a scientific research organization dedicated to leading the nation's discovery, development, and integration of warfighting technologies for air, space and cyberspace. AFRL–NM, located at the Kirtland Air Force Base in Albuquerque, is home to the Directed Energy and Space Vehicles Directorates.

The Space Vehicles Directorate is the U.S. Air Force's Center of Excellence for space technology research and development. It's mission is to develop and transition high pay–off space technologies to provide the military with space–based capabilities. Areas of major importance include space–based intelligence, surveillance and reconnaissance, space situational awareness, space communications, position navigation and timing, and defense of space assets and space superiority.

Sandia National Laboratories
$3.17B BUDGET | 10,940 EMPLOYEES
$267M TO SMALL BUSINESS IN NM
Sandia National Laboratories has five major program portfolios: nuclear deterrence; defense nuclear nonproliferation; national security programs; energy and homeland security; and advanced science and technology. Of its nearly 11,000 employees, 6% are students and 52% of are involved in R&D. Space Mission is a program within these portfolios that delivers sensing solutions to address a wide range of complex, national security issues in space. Another program of importance to space is Surveillance and Reconnaissance (S&R) which designs, tests, and integrates cutting–edge technology to demonstrate, field, and support high–impact S&R systems for the end–user. The S&R program was developed from Sandia's nuclear weapons radar capability, which led to Sandia's initial development of Synthetic Aperture Radar (SAR) systems for non–proliferation missions more than 25 years ago. Sandia has a long history delivering innovation and unprecedented performance in groundbreaking radar systems, algorithms, and technologies.

Los Alamos National Laboratory (LANL)
$2.66B BUDGET | 9000 DIRECT EMPLOYEES
650 CONTRACTOR PERSONNEL
Los Alamos National Laboratory applies world–changing science and technology to current and emerging national and global security challenges, and welcomes a diverse workforce that ensures the talent necessary for success. LANL has designed, built, and analyzed data from instrumentation for space missions both near and far for more than 50 years. Today, the Intelligence and Space Research Division continues the Laboratory's legacy of ensuring our nation's security, discovering the processes that govern the space environments, studying the composition of planetary bodies, and capturing the most distant, most powerful cosmic explosions. Los Alamos has flown about 400 instruments comprising more than 1,400 sensors on more than 200 total launches.

New Mexico Research Universities

New Mexico is home to three research universities: New Mexico State University (NMSU), New Mexico Tech (NMT), and the University of New Mexico (UNM), all of which are Hispanic–serving institutions that graduate over 40% minority STEM graduates in the nation. Niche sectors where New Mexico universities stand out include engineering and the sciences, resulting largely from our long history as a world–class research center being home to several federal and private sector research institutions. Each of the universities have commercialization and economic development organizations to support the growth of the space industry. These organizations are highlighted in the New Mexico Tech Ecosystem section.

New Mexico State University (NMSU) sits on a 900–acre campus and enrolls more than 15,000 students from 49 states and 89 countries resulting in a multi–cultural population of students and community members across the state. NMSU has developed an international track record in research and development in several disciplines including: animal and range science, biochemistry, molecular biology, genetics, computer science, energy, medical and health sciences, space and aerospace, water and other environmental issues.

The University is also designated as a NASA Space Grant College, meaning that it is part of a consortium of institutions that support and specialize in research, science, and engineering to provide education and participation in activities related to NASA's aeronautics and space projects. NMSU's Mechanical Engineering (ME) Department includes an undergraduate degree program in Aerospace Engineering whose graduates will be prepared as leaders in research, design, construction and analysis of aircraft, satellites, manned and unmanned space/aerial vehicles, and the systems they incorporate.

New Mexico Tech (NMT) is dedicated to advancing science, technology, engineering, and mathematics through research, education, and innovation. The diverse student body is taught through rigorous and collaborative programs that prepare scientists and engineers for the future. New Mexico Tech's innovative and interdisciplinary research expands the reach of humanity's knowledge and capabilities through the solving of real–world problems. For the second year in a row, College Factual ranked New Mexico Tech the best college in terms of cost and value in both Engineering and Physics. NMT also repeated its number one ranking in Chemical Engineering and Mechanical Engineering while remaining in the top 2% among all universities in Computer Science and in the top 2% in Physical Sciences.

The University of New Mexico (UNM) is a comprehensive, Carnegie–designated Research 1 University and is the nation's only flagship state university that is also a Hispanic Serving Institution. UNM is a place where cutting–edge research and creative endeavors flourish. Among the university's outstanding research units are: the Center for Advanced Research Computing, Cancer Center, New Mexico Engineering Research Institute, Center for High Technology Materials, Design Planning Assistance Center, and the Mind Research Network.

The University of New Mexico School of Engineering's online program in Internet of Things (IoT), is ranked number one on a list of the 2019 Most Affordable Online Master's Programs in Computer Engineering by OnlineU. The program focuses on embedded electronics, software, sensors and networking capabilities, which collect and exchange data on a massive scale. Additionally, last year, UNM's computer engineering master's program ranked number 22 in the U.S. by Best

Computer Science Schools. Christos Christodoulou, Jim and Ellen King Dean of Engineering and Computing, said, "One of our main focuses in the School of Engineering is innovation, and this carries out not only in our research but also in the classroom and in meeting the needs of an ever–evolving student population."

UNM's School of Engineering also offers an online master's degree in space systems engineering, and it is one of the first master's–level space systems engineering programs in the country. The degree programs were developed with careers in mind, with input from the Air Force Research Laboratory to provide graduates with the advanced skills to further their career in the space systems industry.

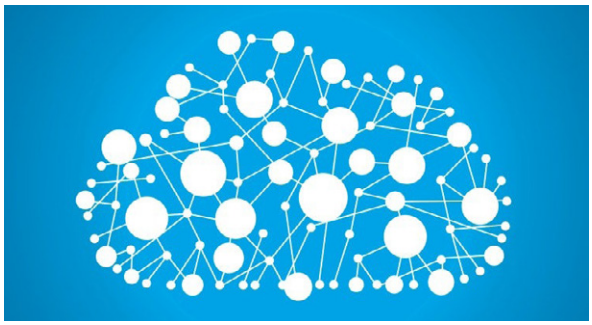
White Sands Missile Range

The U.S. Army White Sands Missile Range, DoD's largest, fully–instrumented, open air range, provides America's Armed Forces, allies, partners, and defense technology innovators with the world's premiere research, development, test, evaluation, experimentation, and training facilities to ensure our nation's defense readiness. Our vision is to be the premier open air test range, for U.S. and Allied customers, delivering superior testing, evaluation, research, exercises, training, innovative products, and venues through a highly skilled and adaptive workforce. Always the best value; focusing on affordability and stewardship of resources, providing results that consistently exceed customer expectations while providing a high quality of life for our service members, civilians, and families.

NASA Johnson Space Center (JSC) at White Sands Test Facility

White Sands Test Facility tests and analyzes potentially hazardous materials, components, and

systems including Composite Pressure Systems, Critical Systems and Materials Flight Acceptance, Hypervelocity Impacts, Oxygen Systems, Propellants and Aerospace Fluids, and Propulsion Systems. As a self–contained facility, our on–site testing support, Environmental Management, Safety and Mission Assurance, and Protective Services personnel work hand–in–hand with our test teams to safely provide quick, responsive, high–quality results.



NM Technology Ecosystem

ABQID – Hyperspace Challenge: Tech Startups + Defense Innovators = Accelerated Innovation. Hyperspace Challenge, powered by the Air Force Research Lab – New Mexico and ABQid, brings together tech startups with defense innovators to accelerate innovation for the defense community. The unique program facilitates interactions between promising technologies and timely problems to increase rapid acquisition and contracting opportunities. The goal isn't innovation at the speed of light; it's faster.

AF Enhanced Use Lease: Thunderbird Kirtland Development has formalized an agreement with the Air Force to create a state–of–the–art 70+–acre industry campus at west edge of Kirtland Air Force Base, named Max Q at Kirtland. The development will be adjacent to the Air Force Research Laboratory's world–class space systems and directed energy research and development laboratories, as well as many key Air Force partners. Industry partners will have unparalleled access to partnering opportunities as well as access to the Air Force's personnel, resources, and extensive test facilities and equipment. The many amenities and enhancements will include light manufacturing facilities; flex space for both office and laboratory services; on–site data center at varying security levels; hotel and conference facilities; health, fitness, retail and entertainment.

AFRL–NM Technology Engagement Office: AFRL–NM's Technology Engagement Office facilitates the transfer of AFRL technology for defense and non–defense commercial applications. In addition to vigorously pursuing the successful commercialization of laboratory technologies, the Technology Engagement Office actively cultivates New Mexico's capacity for innovation and entrepreneurship by supporting STEM–education opportunities for New Mexico youth. AFRL is one the initial tenants of the Lobo Rainforest building in the heart of Innovate ABQ.

Arrowhead commercializes technology and helps small businesses at all stages start and grow through services, resources, connections, and expertise. The Arrowhead is committed to economic development in the region and has established services to help researchers, start–ups, and entrepreneurs pioneer new technologies, businesses, and partnerships. As part of NMSU, Arrowhead works with students and provides them with client–based learning opportunities to accelerate their knowledge of economic development and tools that will make them responsive to the growing demands of the business world.

Arrowhead Park at NMSU is a 200–acre master planned community for science, technology, and business poised at the crossroads of interstate highways I–10 and I–25 in southern New Mexico, showcasing NMSU's commitment to regional economic impact. Home to over 25 active businesses and dozens of startups, Arrowhead Park is an ideal setting to locate and grow your business. Through the provision of affordable land and space, connections to NMSU and the surrounding community, and the unique program offerings of Arrowhead Center, they are committed to offering their partners the most valuable business and technology resources and state–of–the art amenities available.

CNM Ingenuity: CNM Ingenuity manages all of CNM's commercial and entrepreneurial activities. CNM's slate of entrepreneurial initiatives include

the Deep Dive Coding program, FUSE Makerspace Downtown, and CNM's IGNITE Community Accelerator. CNM Ingenuity recently announced that ABQid business accelerator will become part of their program.

Lobo Rainforest building in Innovate ABQ

Innovate ABQ: Innovate ABQ is a public–private partnership created to develop a 7–acre innovation district in downtown Albuquerque to foster economic development and job creation in New Mexico. The site is intended to help put the region on a path to higher growth by improving the productivity of people and firms in ways that lead to better incomes and living standards for all. This vision includes more than 720,000 square feet of physically compact, technically wired, walkable space devoted to bringing together New Mexico's innovators to foster the creation of long–term, job–creating ventures and increase access to opportunity for the entire community.

New Mexico Tech Office of Innovation Commercialization (OIC): The vision for the OIC is to foster an environment where researchers, faculty, and students are actively engaged with the outside world (partners and potential customers) in their research and development of new technologies and ideas. This will not only provide game–changing learning experiences for students, but will also result in unique business opportunities for both inventors and New Mexico Tech. This rich campus–wide environment of innovation will prepare students graduating directly contribute to new technology companies to forming in New Mexico. These graduates will be uniquely able to drive the innovation ecosystem – in startups, venture capital firms, and many other roles – in New Mexico and elsewhere.

Richard P. Feynman Center for Innovation (FCI): The Feynman Center is Los Alamos National Laboratory's partnering organization made up of 46 employees with an annual budget of $10.3M. Its four core areas are inventing, innovating, disrupting, and partering. Los Alamos National Laboratory has been inventing for the past 75 years to accomplish the difficult, the unexpected, and at times, what seems impossible. Los Alamos' immense contributions in leading edge science and technology research and development are directed into solving complex and forthcoming national security challenges. Known well for developing the first nuclear weapon, big and small science at Los Alamos is behind many other disruptive innovations. Los Alamos science has assisted partners big and small with their toughest challenges.

Sandia Science & Technology Park (SS&TP): SS&TP is a 300+ acre master–planned technology community. Affiliated with Sandia National Laboratories and adjacent to Kirtland Air Force Base, companies have easy access to world–class facilities, technologies, scientists, and engineers. From startups to Fortune 500 companies, the SS&TP is where technology works. There are 45 companies and organizations employing 2,059 people at an annual salary of $83K with $385M of investment.

Sandia's Technology–based Economic Development: Sandia has four outstanding programs to engage the technology community New Mexico Small Business Assistance (NMSBA), Sandia Science & Technology Park, Entrepreneurial Separation to Transfer Technology, and Entrepreneur Exploration (EEx)

supporting 188 small businesses, 158 Sandia entrepreneurs leaving the labs, and 109 companies expanded or started. The Center for Collaboration and Commercialization (C3) serves as a public face for Sandia National Laboratories, providing access to the Labs and building linkages with the community. Located in the heart of Albuquerque's Innovation District, C3 is dedicated to increasing Sandia's collaboration and commercialization activities.

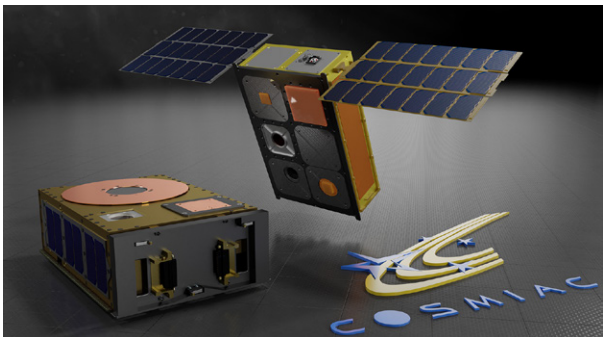
Santa Fe Business Incubator (SFBI): Santa Fe Business Incubator provides a supportive environment for entrepreneurs who have the passion and tenacity to launch and grow businesses that create new jobs, diversify the economy, and enhance the quality of life for all in the community. SFBI has built in its 30,000 square foot facility, office, lab and light manufacturing space, for which it offers clients affordable short–term leases.

STC: STC@UNM plays a vital role in New Mexico economic development and to be an innovator in technology commercialization worldwide. As a New Mexico University Research Park and Economic Development Act organization, STC.UNM does this by:

- Protecting technologies developed at UNM and transferring these technologies to the marketplace, via starting new companies and transferring technologies to established companies;
- Connecting the business community to UNM for access to expertise, facilities, and research activities; and
- Facilitating UNM's role as a contributor to New Mexico's economic development.

STC's dedicated staff is business–oriented, and their job is to understand the potential market applications of the wide range of technologies developed at UNM and to efficiently get them to companies that can commercialize them.

UNM COSMIAC: COSMIAC is an innovative research center at UNM in Albuquerque. COSMIAC serves as a Tier–2 Research Center at the School of Engineering, and currently consists of approximately 25 full time faculty, staff, and consultants and 30 undergraduate and graduate students, all of whom are US citizens. Customers include (but are not limited to) the US Air Force, NASA, Lockheed Martin, Northrop Grumman and Blue Origin.



The vision of COSMIAC is to be the nation's center of excellence and specialized talent source for developing technical solutions for aerospace and defense applications. A major portion of COSMIAC's charter is the acceleration and incubation of small and large businesses in New Mexico. With small businesses hosted on all three floors of COSMIAC, the desire is to create a capability where academia and small business can be found in the same location.

UNM Science & Technology Park: The Science & Technology Park at UNM is owned and managed by the University of New Mexico. The park is comprised of 163 acres, 41 of which were developed during Phase I. Phase II has commenced with the development of an additional 42 acres. Future phases will encompass approximately 80 acres. The Park was established in 1965, revived in 1988, and today consists of approximately 662,662 square feet of existing research and development, laboratory, office and mixed–use space. The tenant focus is on technology–based companies.

NM Business Environment

Capital

New Mexico's funding landscape includes a diverse collection of grants, seed investors, philanthropic support, venture capitalists and private equity funds. The concentration of available capital is for early–stage investment in a company's

development. More effort is required to increase the amount of late– and growth–stage investment capital. This is a strategic recommendation for New Space NM to establish a public–private space investment fund.

> $50 Million	Sun Mountain Capital
$21 – $50 Million	Verge Fund, Flywheel Ventures LLC, High Desert Angels, State Investment Council, New Mexico Angels, Cottonwood Capital Partners LLC
$10 – $20 Million	New Mexico Community Capital Signal Peak Ventures
<$10 Million	NMA Ventures, ABQid, New Mexico Tech, Feynman Center, NMSU Arrowhead, UNM STC Co–Investment Fund

New Mexico Catalyst Fund: The Catalyst Fund is a $20 million fund–of–funds created to increase seed and early–stage investment in New Mexico. As a fund–of–funds the Catalyst Fund will invest in existing and emerging portfolio funds. These portfolio funds in–turn will raise a matching $20 million in private equity making $40 million available for investment in local startups. The Catalyst Fund is expected to support more than 50 companies in New Mexico and will focus on technology startups. The funds receiving Catalyst investment as of 2018 are as follows:

- Arrowhead Innovation Fund is focused on seed and early–stage investments to commercialize promising technologies developed by affiliates of New Mexico State University and participants of programs at NMSU's Arrowhead Center.
- Cottonwood Technology Fund is focused on seed and early–stage investments in fields such as bioscience, new energy, nanotechnology, information technologies, cleantech, and aerospace.

- Tramway Venture Partners is focused on seed and early–stage investments in bioscience and biotechnology.
- The ABQid invests in startups that have successfully completed the ABQid Accelerator. The ABQid fund supports a variety of startups within a theme approach. The first theme, Health and Wellness, launched in 2017 to invest in NM–based startups building a healthier future, and other themes are in planning for launching in 2018 and 2019.
- NMA Ventures funds early–stage high–technology companies based in New Mexico. Ideal investment companies have a strong team, high–growth market opportunity, portfolio of intellectual property and a clear path to market.
- BlueStone Venture Partners is a new venture capital firm focused on life science technology opportunities in the Southwest. BlueStone is focused on early stage opportunities and believes that New Mexico has a significant amount of investment opportunity in this sector and stage of investment. BlueStone has offices in New Mexico and Arizona.

New Mexico Business Incentives

New Mexico has many business incentives. (A link to a more comprehensive overview is provided in Appendix 2 entitled New Mexico Business Incentives Overview.) Below are highlighted incentives applicable for the space industry.

Job Training Incentive Program (JTIP): The New Mexico Job Training Incentive Program is a highly flexible state program that provides on–the–job training. Customized training may be provided by post–secondary educational institutions, company trainers, or outside trainers.

The High Wage Jobs Tax Credit provides businesses with a tax credit equal to 10% of the value of salaries for each net new job paying a net taxable wage of at least $60,000 per year in communities with a population of 40,000 or more. Companies located in communities with a population less than 40,000 are eligible for the same tax credit for each net new job paying a net taxable wage of at least $40,000. The credit is capped at $12,000 per job per year. The current credit sunsets in June of 2020, but it is expected to be renewed.

Manufacturing Investment Tax Credit: New Mexico tax law provides for a credit equal to 5.125% of the value of qualified equipment and other property used directly and exclusively in a manufacturing operation. The credit can be applied against compensating tax, gross receipts tax, and withholding tax. Gross receipts tax acts very much like a sales tax; the Albuquerque rate is 7.875%. Compensating (or use) tax applies to purchases made out of state and is 5.125%.

Military Acquisition Program Tax Deduction: Receipts from transformational acquisition programs performing research and development, testing, and evaluation at New Mexico major range and test facility bases pursuant to contracts entered into with the U. S. Department of Defense may be deducted from gross receipts.

Space Gross Receipts Tax Deduction: Businesses may deduct receipts from launching, operating, preparing, recovering space vehicles or payloads from a spaceport in New Mexico and also from the provision of research and development, testing and evaluation services for the U.S. Air Force operationally responsive space program. Tax credits are also available for research and development services sold or for resale to the U.S. Air Force.

Directed Energy Systems Gross Receipts Tax Deduction: Contractors, other than a national laboratory, that provide qualified research and development services for directed energy and satellite–related inputs to the United States department of defense, may deduct their receipts derived from such inputs and services. This deduction only applies to contracts with the DoD entered into on or after January 1, 2016. This credit sunsets January 1, 2021.

Technology Jobs and R&D Tax Credit: Qualified New Mexico facilities may take a credit equal to 5% (10% in rural areas) of qualified research expenditures related to payroll, land, buildings, equipment, computer software and upgrades, consultants, and contractors performing work in New Mexico, technical books, manuals, and test materials. The credit may be taken against compensating tax, gross receipts tax (excluding the local options portion of the gross receipts tax), and withholding tax. The credit may be carried forward for up to three years. An additional 5% (10% in rural areas) may be applied against corporate income tax or personal income tax if base payroll expenses increased by at least $75,000 per $1,000,000 of expenditures claimed. The credit may be carried forward for up to three years.

Industrial Revenue Bond (IRB): New Mexico's property taxes are among the lowest in the nation for both real and personal property. Property taxes can be further abated through the use of an Industrial Revenue Bond (IRB). Communities across New Mexico have the ability to issue IRBs to support economic development projects.

NM SBIR Matching Grant: New Mexico's Small Business Innovation Research Matching Grant encourages the creation and expansion of commercial enterprises based in New Mexico through the

acceleration of the commercialization of innovation and technologies developed with federal SBIR awards. The New Mexico SBIR Matching Program provides matching funds to New Mexican companies that have been granted federal SBIR awards. The purpose of these funds is to assist businesses in achieving development and commercialization goals. This is a competitive program.

Local Economic Development Act (LEDA): The Local Economic Development Act (LEDA) (5–10–1 to 5–10–13 NMSA 1978) allows the state and local governments to offer limited, discretionary financial participation in qualified economic development projects. These funds are targeted toward private sector, economic–base businesses, that can demonstrate additional funding is needed to close a competitive cost gap. LEDA discretionary funds can only be used for reimbursement of eligible expenditures tied to land, building(s) and/or infrastructure. LEDA funds cannot be used for equipment or working capital.

STEM Programs

America's capacity for technological innovation is one of its greatest strengths and is key to on–going economic and military security. A relative scarcity of STEM professionals threatens to undermine the nation's innovation economy and its military superiority. The nation's public education system is struggling to keep up with the increasingly technical demands of America's employers at the same time that a large portion of the STEM workforce is transitioning to retirement. New Mexico has a number of excellent STEM programs.

"We can help New Mexicans better understand the resources we have. Our state's diverse people, rich cultural histories, physical beauty, and natural resources are unparalleled. We have the intellectual capital and institutions to help lead the world in science, technology, engineering, math, health, art, culture and more. And we have vibrant, albeit a bit random, STEM communities of practice across New Mexico. The challenge now is to marshal our resources in ways that respects local creativity and energy and still moves all of New Mexico forward."
– NM STEM Collaborative

AFRL STEM: Cultivating the next generation of scientists and engineers is critical to AFRL–NM's mission of leading the discovery, development, and integration of warfighting technologies for air, space, and cyberspace. AFRL–NM's STEM programs leverage lab talent and expertise to augment STEM instruction and help build the STEM skills of New Mexico educators. Professional educators oversee AFRL–NM STEM programs. In addition, teachers whose classes participate in STEM programs receive special training and AFRL–NM scientists and engineers assist students as they explore STEM concepts in context. AFRL–NM contributes a $4 million annual budget for STEM outreach programs.

The AFRL–NM Scholars Program offers paid summer internships to high school, undergraduate, and graduate students interested in STEM disciplines. Scholars come from all over the U.S. to work for eight to 10 weeks on cutting–edge research with AFRL–NM scientists and engineers. In 2016, funding for the program totaled $2 million and out of the 745 students who applied for internships, 158 were selected. Fifty–five of that year's AFRL–NM Scholars were from New Mexico.

AFRL K–12 STEM Outreach – AFRL La Luz Academy: The program integrates AFRL–NM technologies and utilizes AFRL–NM scientists and engineers in the development and delivery of the outreach activities. Funding for 2016 program totaled $900,000. Each year, roughly 3,000 students and 150 teachers

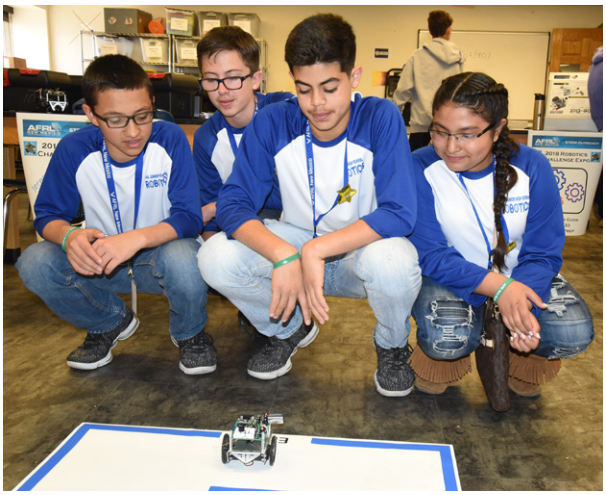
participate in La Luz Academy's structured missions. Since 1992 La Luz Academy's structured missions have impacted 67,182 students. The Academy impacts an additional 6,000 students and 150 teachers annually by providing hands–on STEM exploration activities at school and community events. La Luz Academy also helps build the STEM skills of New Mexico teachers. The Teacher Institute, held for a week in the summer, provides teachers with an opportunity to complete a team STEM project and learn from AFRL–NM STEM experts.

AFRL University NanoSat Program (UNP): UNP funds U.S. university students and programs to design, build, launch, and operate small satellites. UNP is nationally recognized with its own funding line on the President's Portfolio of Science, Technology, Engineering, and Math. UNP's objective is to train the next generation of space professionals by providing a rigorous concept– to–flight–ready spacecraft development process centered on systems engineering principles and practices. UNP provides AFRL and DoD parties the option to leverage technologies and platforms in research areas of interest to AFRL. Finally, UNP provides AFRL and industry a workforce pipeline made up of over 300 students annually who have been trained in small satellite development.

LANL STEM: In 2017 Los Alamos National Laboratory supported more than 43 regional K–20 math and science education programs, and employed 1,600 student interns. Los Alamos Employees Scholarship Fund awarded $566,750 in scholarships to 95 northern New Mexico students and provided more than 3,288 hours of science education community service time.

NMSU Arrowhead Innoventure encourages teamwork to solve real–life problems and gives K–12 students the opportunity to learn about entrepreneurship and innovation.

UNM–AFRL Mentoring Program matches UNM undergraduate students with AFRL–NM scientists and engineers to provide personal and professional mentorship. The program, which began in 2015, currently supports 23 mentor/mentee partnerships. Mentors help mentees cope with professional stress, master study skills, plan their courses, and uncover opportunities, such as internships and special scholarships, which will help them in their careers. The mentor–mentee relationship also helps students build confidence, leadership skills, and teamwork ability.



New Mexico's Living Environment: The Land of Enchantment

Quality of Life, Beauty, Culture, and Adventure

Living in New Mexico provides the opportunity to enjoy its many enchanting treasures. New Mexico is considered a high–elevation desert, which lends itself to each of the four seasons. Residents and visitors alike can enjoy beautiful hikes with breathtaking views in any of the 35 state parks or three national parks, world–class skiing (Taos, New Mexico was recently ranked as the top trending ski destination in the U.S.[14], and No. 8 of "The 25 Coolest Towns in America."[15]), vibrant fall colors as the Aspens in Santa Fe and the Maples in the

14 *According to a report by travel search and booking engine Kayak.com*

15 *in travel outlet Matador Network's*

Skier at Santa Fe Ski Area just after a nice drop of fresh pow pow!

Manzanos change, and water sports such as water skiing and scuba diving.

New Mexico offers a variety of different activities that can please any appetite. The Sandia Tramway will take you to top where you can mountain bike, hike, ski, or snowboard. Just think, from late fall to early spring you could ski in the morning and in the afternoon head back to town and golf. New Mexico and now Albuquerque has a flourishing craft brewery scene. In fact, Travelocity named Albuquerque as the one of the top 10 beer cities in the United States.[16]

In addition to outdoor activities and natural beauty, there are many ways to experience a varied, rich culture by visiting the state's many museums, historical sites (including 10 national monuments), art galleries, and festivals. The most famous festival is Albuquerque International Balloon Fiesta wherein hundreds of hot air balloons scatter throughout the sky. Additionally, sports fans can quench their competitive appetite by attending the University of New Mexico Lobos games and local minor–league Albuquerque Isotopes baseball games.[17] During the summer, thousands travel to New Mexico for the Santa Fe Opera season, which offers world–class performances in a unique venue surrounded by the Jemez Mountain range to the west and the Sangre de Cristo Mountain range to the east.

Overall, the quality of life New Mexican's partake in is an attractive feature for motivating businesses to locate to the state. We have a strong presence

in the following industries: aerospace and defense, advanced manufacturing, data centers, value–added agriculture, logistics and distribution, technology commercialization, energy and renewable resources, and digital media.

Proximity to Funding Markets – Silicon Valley

The Albuquerque International Sunport provides nonstop service to 24 cities daily via nine commercial carriers, making access to funding markets with little difficulty. The state is crisscrossed by 3 major interstates, forming efficient grid access to markets inside/out of NM.

- Ideal market access throughout the Mountain region as well as Central and Pacific U.S.
- Extremely low risk of natural disasters and disruptive weather events.
- Strong transportation infrastructure linkages to Mexico, with three border crossings, and Canada

Housing, Cost of Doing Business

A median–priced home in New Mexico costs $187,100 and the cost of living in Albuquerque, NM (which holds 25% of the state's population)

16 *Is Albuquerque The Next Trendy City? | Travelocity.com*

17 *https://livability.com/top-10/culture/10-best-cities-for-stem-workers/2018/nm/albuquerque*

is 5% below the national average.)[18] New Mexico also has a friendly business environment with the lowest effective corporate income tax rate for manufacturing according to Ernst & Young. Other tax incentives include: 22% reduction in corporate income tax for all industries, optional single weighted sales factor for headquarters and manufacturing operations, eliminated GRT on manufacturing consumables, among the lowest property taxes in the nation, and no inventory tax. New Mexico also offers several programs that benefit businesses such as the Job Training Incentive Program (JTIP), which offers economic base companies a cash reimbursement to help train New Mexican employees. Another popular program is the Local Economic Development Act (LEDA), a discretionary state incentive that can be used as a cash reimbursement towards land, building, or infrastructure.[19]

New Mexico's Space Events

Las Cruces Space Festival is held every April in order to raise awareness and celebrate space–related activities and interest in the region. The festival is fun for all ages and free to attendees who are entertained by all manner of space–related activities including: expert presentations, science and technology demonstrations, art, theater, music and film, hands–on experiments, and rocket launches. These attractions tell the history of space exploration from Dr. Robert Goddard's contributions to modern rocket propulsion to rocket launches at White Sands to the world's first commercial spaceport at Spaceport America.[20] Other histories and achievements are highlighted from companies such as Virgin Galactic, Boeing, and NASA.[21]

Spaceport America Cup
Spaceport America with partner Experimental Sounding Rocket Association hosts more than 1,500 college students from around the world, along with participating aerospace companies, recruiters, media and spectators to launch solid, liquid, and hybrid rockets to altitudes of 10,000 and 30,000 feet every year during the third week of June. Spaceport America welcomes teams representing universities from around the world for the largest international intercollegiate rocket engineering competition. Cheers and excitement fill the air at Spaceport America's Vertical Launch Area. The university rocket teams are composed of students from many backgrounds and disciplines. It takes more than rocket scientists to make the project come to life.

18 https://www.bestplaces.net/cost_of_living/state/new_mexico
https://www.payscale.com/cost-of-living-calculator/New-Mexico-Albuquerque

19 https://nmpartnership.com/why-new-mexico/pro-business-environment/

20 https://www.nasa.gov/centers/goddard/about/history/dr_goddard.html

21 https://lcspacefestival.com

The Spaceport America Cup brings many space industry sponsors including Virgin Galactic, Blue Origin, Boeing, Fiore Industries Inc., Misumi, Aerojet Rocketdyne, Raytheon, Jacobs, United Launch Alliance, SpaceX, Professional Aerospace Contractors Association, Virgin Orbit, Northrop Grumman, International Symposium of Personal and Commercial Spaceflight , New Mexico Space Grant, and Commercial Spaceflight Federation.[22]

Professional Aerospace Contractors Association (PACA) Briefing for Industry is held annually in August providing a comprehensive summary of business opportunities from Department of Defense, Department of Energy, NNSA, NASA, and other Government agencies.

International Symposium for Personal and Commercial Spaceflight (ISPCS) held annually in October ISPCS is focused on the commercial space industry, space exploration, military, civil and commercial spaceflight, and human space travel

STEM Boomerang hosted annually in December to re–introduce highly educated STEM professionals to the New Mexico high tech economy, including economic, government, aerospace, biotech/tech and business leaders from across the state for the purpose of job matching, sharing ideas and redeveloping a connection to the local and state economy.

New Mexico's Space Organizations

The following New Mexico space professional organizations are partner organizations with New Space NM. The goal for New Space NM efforts are to complement these professional organizations' missions and leverage our resources to grow, expand and attract the New Mexico space industry.

Professional Aerospace Contractors Association (PACA)
The Professional Aerospace Contractors Association (PACA) of New Mexico was founded in 1984 to promote a healthy and vigorous relationship between the aerospace industry and Government agencies. Since then it has become widely recognized and used by all Government agencies in the area as a forum for interaction with the aerospace, defense, and related national industries.

The American Institute of Aeronautics and Astronautics (AIAA)
AIAA's purpose is to ignite and celebrate aerospace ingenuity and collaboration, and its importance to our way of life. AIAA's promise is to be a vital lifelong link to the aerospace community and a champion for its achievements. There is an AIAA Local Chapter in Albuquerque, NM.

Aerospace States Association is an organization of state Lieutenant Governors, Governor appointed delegates and associate members from the aerospace industry, academia, and non–profit organizations. ASA represents states interests in federal aerospace and aviation policy development.

Summary

New Mexico is poised to capture the growing commercial space industry by launching from the assets already in the state. Between our intellectual capital, space industry, Spaceport America, DOD and DOE leaders, investment and infrastructure, there is no state that can match us. Let's take off from this point and take a leadership role in space in the nation! The time is now!

APPENDICES / LINKS

1. NM Space Industry List: www.newspacenm.org
2. New Mexico Business Incentives Overview: www.abq.org/incentives.aspx
3. NM EDD Our Space, Your Rocket: The Aerospace Industry in New Mexico, 2016: gonm.biz/uploads/documents/publications/AerospaceWEB.pdf
4. Innovate! New Mexico, New Mexico Science & Technology Plan: gonm.biz/uploads/documents/publications/INNOVATE_NM_FINAL_VERSION_DEC_2015.pdf
5. Philosophy Report on Commercial Space: www.newspacenm.org

22 https://www.spaceportamericacup.com/about-the-event.html

THE FUTURE IN SPACE IS IN NEW MEXICO

NEW SPACE NEW MEXICO

NEWSPACENM.ORG