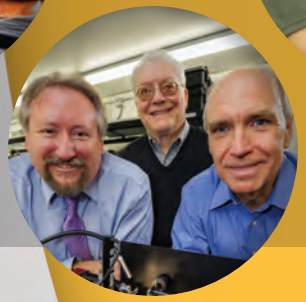








NMSBA
Los Alamos National Laboratory
Sandia National Laboratories

Solving New Mexico's Small Business Challenges

NMSBAprogram.org

Los Alamos NATIONAL LABORATORY

Julia Wise, Program Lead
P.O. Box 1663, C333
Los Alamos, NM 87545
505-665-5827 jlwise@lanl.gov

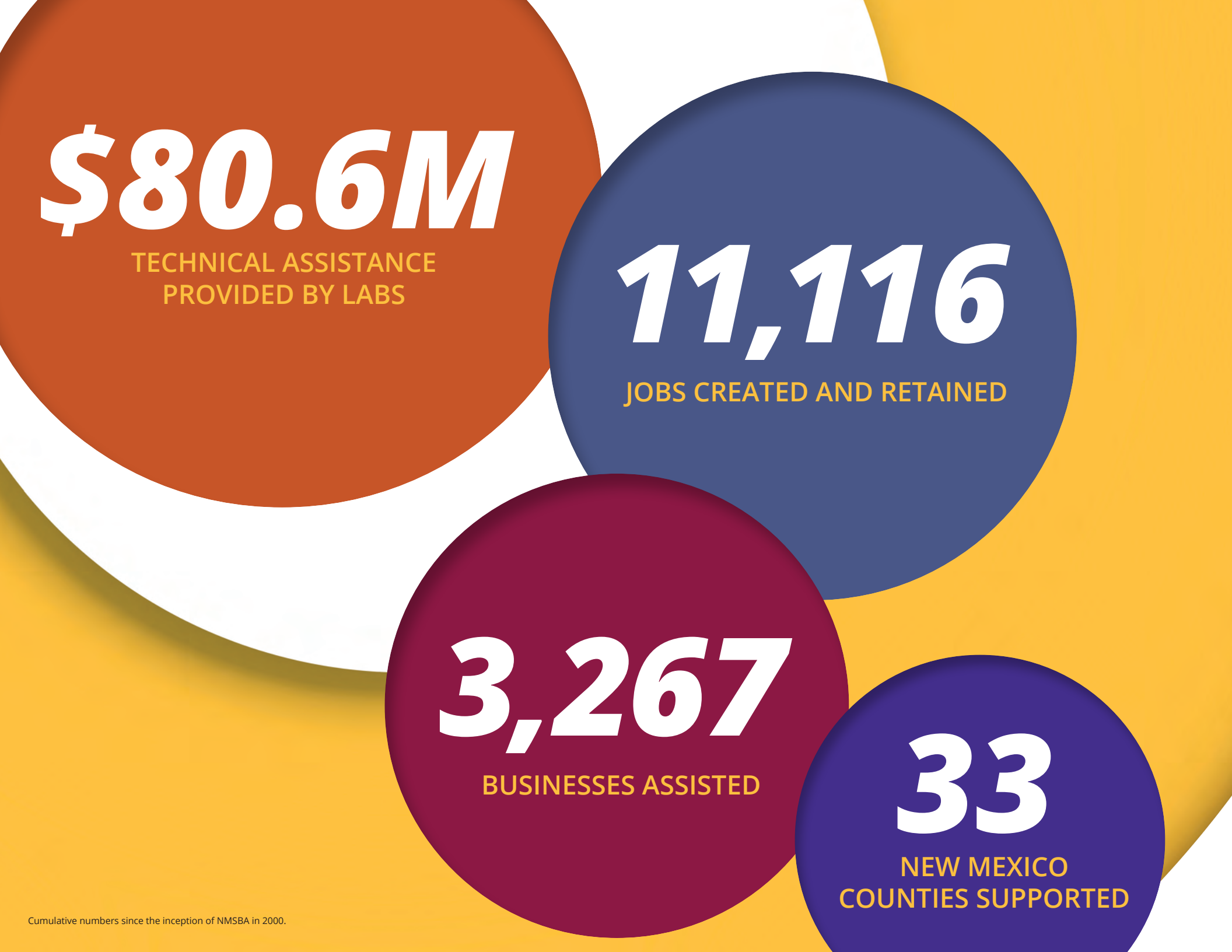
Sandia National Laboratories

Genaro Montoya, Program Leader
P.O. Box 5800 MS 1495
Albuquerque, NM 87185-1495
505-284-0625 gmontoy@sandia.gov

U.S. DEPARTMENT OF ENERGY NNSA National Nuclear Security Administration

PERSPECTIVES 2022 ANNUAL REPORT

NMSBA
Los Alamos National Laboratory
Sandia National Laboratories



Cumulative numbers since the inception of NMSBA in 2000.

CONTENTS

On the cover: Research Assistants Goutham Dev Ashish Bojja and Geovanny Zareceño, Mercury Bio.

Thousands of small businesses across the state have benefited from NMSBA. By leveraging the expertise of the scientists and technical experts at our federal research labs, New Mexico's small businesses are creating jobs, innovating, and helping to solve complex problems in the global community.

ALICIA J. KEYES
Cabinet Secretary
Economic Development Department
State of New Mexico

NMSBA is an incredible resource for New Mexico businesses. By leveraging the expertise of the state's two national laboratories, the Program has helped to create thousands of jobs for New Mexicans at small businesses over the years.

STEPHANIE SCHARDIN CLARKE
Cabinet Secretary
Taxation and Revenue Department
State of New Mexico

Dear Governor Lujan Grisham and New Mexico State Legislators,

We are pleased to present the 2022 Annual Report for the New Mexico Small Business Assistance Program. This report highlights a few of the hundreds of successful projects from 2022 and provides metrics for the performance of NMSBA, for the past year and since its inception in 2000.

During 2022, a total of 239 small New Mexico businesses participated in NMSBA. Thanks to the Laboratory Partnership with Small Business Tax Credit Act, the State of New Mexico, along with Los Alamos National Laboratory and Sandia National Laboratories, invested $4.55 million of national laboratory expertise and resources to help small businesses in 24 counties overcome technical challenges and grow.

The success stories in this report demonstrate the impact NMSBA has on small businesses from a wide range of industries across the state. Here are a few examples from some of the featured success stories:

- After receiving assistance developing nanostructures needed for a special type of optic that will enable a new laser product, a company was able to obtain a $1.15 million Phase II SBIR grant and hire an additional technical staff member.
- A shelf life analysis and market research helped a small farm bring products to retailers across the state, increase sales by 40%, add 17 wholesale accounts, and receive an investment of $30,000 from JTIP.
- The introduction of robotics and other recommended changes have helped a growing manufacturer increase productivity by 15% and output by 600%, hire three new employees, and continue growth to meet demand from its national and global customers.

Since 2000, the NMSBA Program has helped 11,116 jobs to be created and retained across the state's 33 counties.

The Predicting siRNA Leveraged Project received the Honorable Speaker Ben Luján Award for Small Business Excellence for demonstrating the most economic impact. Since completion of its NMSBA project and the technical insight it gained, Mercury Bio, the lead company, raised $2 million in an initial investment round, hired a new CEO, scientists, and technicians, acquired more lab space, and is in the process of raising another $20 million for development of its drug delivery platform and process.

For more than 20 years, NMSBA has helped New Mexico's small businesses create jobs, increase revenues, decrease operating costs, and attract new funding opportunities. Since 2000, the two national laboratories have provided $80.6 million in technical assistance to 3,267 businesses, enabling 11,116 jobs to be created and retained across the state's 33 counties.

Your continued support of NMSBA, which promotes collaboration between our national laboratories and small business community, leads to economic development throughout our great state. Thank you!

Sincerely,

MARIANN JOHNSTON
Los Alamos National Laboratory

DAVID KISTIN
Sandia National Laboratories

PROGRAM INFORMATION

During 2022, NMSBA helped 239 small businesses across the state reach business goals, develop their products for commercial use, and increase profitability.

NMSBA makes a statewide impact by:

- Providing New Mexico small businesses access to cutting-edge technology
- Increasing New Mexico small businesses' technical sophistication and capabilities
- Sharing knowledge and resources between laboratory personnel and small businesses to address issues and develop real-world applications

OVERVIEW

In 2000, the New Mexico Legislature created the Laboratory Partnership with Small Business Tax Credit Act for the purpose of "bringing the technology and expertise of the national laboratories to small businesses in New Mexico to promote economic development in the state, with an emphasis on rural areas." As a result, Sandia National Laboratories established the New Mexico Small Business Assistance Program to provide technical support to small businesses throughout the state. Los Alamos National Laboratory began participating in NMSBA in 2007. Jointly, the labs are committed to solving small businesses' critical challenges with national laboratory expertise and resources; influencing New Mexico business development by building capacity, capabilities, and competencies; and acting as an advocate for small businesses through an entrepreneurial culture.

While each company utilizes NMSBA in a different way, all use it as a means to maintain or grow their business. NMSBA services are provided at no cost to participating small businesses in the form of lab staff hours valued at up to $40,000 per calendar year for businesses located in rural counties and $20,000 for businesses located in urban counties (Bernalillo and Santa Fe Counties). The total amount of assistance is capped at $2.4 million annually for each laboratory. NMSBA may not provide assistance that is available in the private sector, and no equipment or cash can be given to a participating company.

FUTURE DIRECTION

In 2022, New Mexico's businesses used NMSBA to access the advanced technical capabilities available through Los Alamos and Sandia national laboratories. These businesses represent a cross section of emerging high-tech industries in New Mexico—Space & Aerospace, Energy Transition, Artificial Intelligence, Advanced Manufacturing, Sustainable Agriculture, and Bioscience. NMSBA helped companies overcome critical challenges, enabling them to accelerate their development, validate their technologies, attract investment, receive grants, and generate revenue. In 2023, the NMSBA Program will continue to leverage New Mexico national laboratories' technologies, expertise, and networks to stimulate start-ups, accelerate business growth, and address regional community-led development challenges for a sustainable, secure, and equitable future with a renewed emphasis on reaching rural New Mexico.

TYPES OF SMALL BUSINESS ASSISTANCE

INDIVIDUAL PROJECTS

Individual NMSBA projects involve a single New Mexico for-profit small business. Projects address business-specific challenges that can be solved with national laboratory expertise and resources. Technical assistance challenges are wide ranging; however, the majority include testing, design consultation, and access to special equipment or facilities. Requests for individual projects are accepted year-round until funding is exhausted.

LEVERAGED PROJECTS

Leveraged NMSBA projects allow a group of small businesses that share technical challenges to collectively request assistance. Leveraged projects address issues that are too large or complex to solve through an individual project. Proposals for projects are reviewed semi-annually by the NMSBA Advisory Council.

CONTRACT PROJECTS

Legislation allows NMSBA to contract with entities that have the capability to provide small business assistance services not available in the private sector. For the benefit of New Mexico's small businesses, NMSBA has contracts for specific services with the New Mexico Manufacturing Extension Partnership and the state's three research universities.

The New Mexico Manufacturing Extension Partnership provides training and assessments in the areas of quality and lean manufacturing principles.

The Arrowhead Center at New Mexico State University evaluates small business capabilities and technologies using subject matter experts throughout the university.

The New Mexico Tech Business and Technology Management Program interfaces with a variety of disciplines taught at the university to help accurately assess the current competitive position of small business technologies.

The University of New Mexico Management of Technology Program at the Anderson School of Management evaluates the commercial potential of small business technologies and identifies commercialization challenges and pathways.

The University of New Mexico School of Engineering addresses technical challenges faced by small businesses in computer science and chemical, biological, electrical, computer, civil, nuclear, and mechanical engineering.

Dylan DeRaad, Software Engineer and Facility Manager, **Srikanth Kodeboyina**, Founder and Managing Partner, and **Paul Szymanski**, Advisor, Blue Eye Soft.

BLUE EYE SOFT

The work of everyone in NMSBA and the UNM MOT Program gave us a deeper understanding of our market, as well as helped prioritize our initiatives and investments.

Srikanth Kodeboyina

CEO
Blue Eye Soft Corp
dba Blue Space

As society depends more heavily on satellites, the need to predict satellite anomalies due to space weather events has increased. Blue Eye Soft, dba Blue Space, is using AI modeling to develop its SAFER (Space Anomaly Forensics & Environment Resolution) technology for government and commercial space customers.

Blue Space established an office in New Mexico and assembled a team, working with the New Mexico Lab-Embedded Entrepreneur Program to accelerate company development. Looking toward new horizons, the company reached out to NMSBA for help entering the commercial space sector. It was connected to Distinguished Professor Steve Walsh at the University of New Mexico's Management of Technology Program by Los Alamos National Laboratory.

Walsh and his team of ten graduate students prepared Blue Space for the Anderson School of Business Global Scaling Challenge, focusing on transitioning the company's products to the commercial sector. They analyzed production capabilities, technology, technology readiness levels, investment readiness levels, and market discovery potentials, recommending scaling models and improvements to Blue Space's value proposition.

The data and models provided have expedited Blue Space's solution development and informed key decisions, ultimately facilitating its entry into the space economy. Since the completion of its NMSBA project, the company has added four new jobs, and increased its revenue by more than 80%.

Meet the Principal Investigator

Steve Walsh
University of New Mexico

Bernalillo County

Paul Galambos, Principal Investigator, Sandia National Laboratories; **Mark Derzon**, President and **Paul Reynolds**, Systems Integrator, Gold Standard Radiation Detection; **Judy Beckes-Talcott**, President, **Steve Kadner**, Executive Vice President, and **Ripley**, Official Greeter and Security Force, Aquila Inc.

EMERGENCY RESPONSE LEVERAGED PROJECT

The national laboratories are a tremendous resource as an economic engine for technology that is too expensive or expertise that is too difficult to come by for small businesses.

Mark Derzon

President
Gold Standard Radiation Detection Inc.

Bernalillo County

Gold Standard Radiation Detection, an Albuquerque company, designs technologies protecting electronics, such as cellphones, against bursts of radiation and electromagnetic pulses. The company identified a gap in the technology needed for communications during emergencies and disasters that result in loss of infrastructure. It joined Aquila Inc., Next State Systems LLC, Integrative Sourcing LLC, and Korwest to develop technology to aid in emergency communications.

One such technology is an emergency detector to be used in a radiation disaster event. To test and optimize their eVader detector, the companies needed testing in intense radiation environments. They approached NMSBA, which connected them with Paul Galambos at Sandia National Laboratories. Galambos and his team used test cells and facilities at Sandia to evaluate the eVader detector in high radiation dosages to simulate a radiation disaster event.

The project provided the companies with critical data and insights about the survival of their prototypes in these extreme environments. This enabled them to continue design and development of their products and to cross calibrate the eVader system. The lead company, Gold Standard Radiation Detection, is in late state testing of its products with $29,000 in presales and is in negotiations for a licensing agreement with a manufacturer.

Meet the Principal Investigator

Paul Galambos
Sandia National Laboratories

Nicholas Goodman, Executive Assistant and **Ron Unruh**, Chief Operating Officer, Goodman Technologies.

GOODMAN TECHNOLOGIES

The expertise of national laboratories and UNM MOT brought unique perspectives and data on how to grow our business.

Bill Goodman
CETO
Goodman Technologies LLC

Located in Albuquerque, Goodman Technologies manufactures nanocomposites for extreme environments, such as space and hypersonics. The company had been selling to the military and government agencies since its inception, but wanted to scale growth by expanding into commercial markets, where there were applications for some of its products. For example, shielding used on spacecraft can also be used for radiation environments on Earth.

Unfortunately, as the company began to transition some products from the government to the commercial sector, the COVID-19 pandemic arrived and made progress more difficult. To address this, Bill Goodman reached out to NMSBA through Los Alamos National Laboratory, which paired him with Distinguished Professor Steve Walsh at the University of New Mexico's Management of Technology Program.

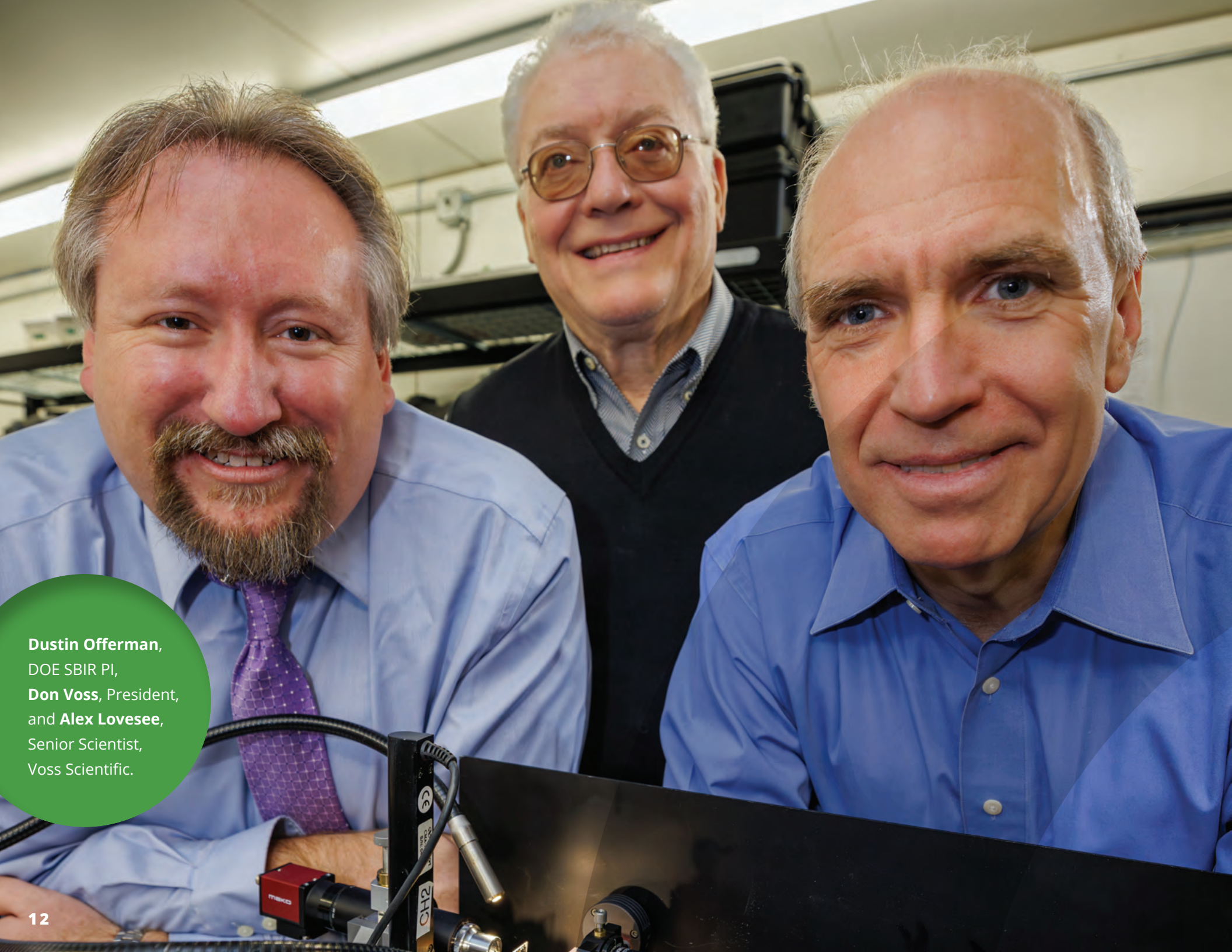
To help scale the company, Walsh and ten graduate students applied Business Analytics, Technology Product Paradigm, and Earned Value Management techniques to assist Goodman Technologies in the Anderson School of Business Global Scaling Challenge. The business analytics process was further enhanced with industry, financial, and trend discovery data outlining pathways to transition government technologies into the commercial sector.

The company is using the results to make presentations to a large number of interested investors. The data was also used in three Small Business Innovative Research proposals totaling $2.95 million, one of which has been awarded and two pending negotiation. And Goodman Technologies recently gained its first commercial customer using the data procured through the NMSBA partnership.

Meet the Principal Investigator

Steve Walsh
University of New Mexico

Bernalillo County



Dustin Offerman, DOE SBIR PI, **Don Voss**, President, and **Alex Lovesee**, Senior Scientist, Voss Scientific.

HIGH LASER INDUCED DAMAGE THRESHOLD METASURFACE PHASE RETARDER LEVERAGED PROJECT

This Program has given us the ability to leverage Sandia's nanotechnology fabrication facility, which has been critical in taking our design from a concept to a produced test sample.

Alex Lovesee
Senior Scientist
Voss Scientific LLC

Bernalillo County

Located in Albuquerque, Voss Scientific provides a wide variety of scientific and R&D services and products, including electromagnetic instrumentation, instrument integration, computational plasma physics modeling, and directed energy sources. Seeking to expand its product line to include high-peak, high-average-power laser systems, it teamed up with InSync Inc. and CNC Machining.

While developing this new product, the companies determined that the laser's behavior was negatively affected by thermally driven distortion, analogous to what you see when light passes over a hot surface. A special type of optic that would compensate for the thermal distortion was needed. Such an optic can be made using nanotechnology to produce a customized metasurface. For the technology to be viable, it has to achieve the desired effect and be able to withstand irradiation from high-powered lasers.

Lacking the expertise in nanoscience and multi-million-dollar equipment necessary to develop the metasurface, the companies sought the support of Ting Shan Luk at Sandia National Laboratories through the NMSBA Program. Luk and his team worked to develop the process for creating the necessary nanostructures that produce the desired optical effect and can handle the high-power laser light without being destroyed.

The results from the NMSBA project enabled Voss Scientific to hire an additional technical staff member and obtain a $1.15 million Phase II Department of Energy Small Business Innovation Research grant. Development of the metasurface optic is ongoing. If successful, the companies will have demonstrated a technology that could enable the DOE to make laser-driven fusion power.

Meet the Principal Investigator

Ting Shan Luk
Sandia National Laboratories

Marcelino Essien, President, **David Keicher**, VP, and **Paul Carpenter**, Researcher, Integrated Deposition Solutions.

INTEGRATED DEPOSITION SOLUTIONS

NMSBA gives companies connection to a diverse group of people, facilities, and technical expertise from national labs that we normally wouldn't be able to access or hire.

David Keicher

Vice President
Integrated Deposition Solutions Inc.

Bernalillo County

Located in Albuquerque, Integrated Deposition Solutions is a global supplier of leading edge aerosol printing solutions using intellectual property licensed from Sandia National Laboratories. The IDS NanoJet printer serves microelectronics, biomedical, and industrial customers.

IDS recently received grants from NASA to develop an aerosol separator for an atmospheric sampling probe to investigate the atmosphere of Venus. This technology focuses aerosol particles into a mass spectrometer through a nozzle and operates continuously for months in a harsh environment.

However, IDS technology usually operates at Earth's atmospheric pressures, so the company needed help to improve its nozzle design and determine how aerosol particles would behave in the atmosphere of Venus and the high-vacuum environment associated with the aerosol analyzer. IDS approached NMSBA and were paired with Josh Hubbard from Sandia to simulate particle trajectories in its aerosol focusing lens system.

Hubbard and his team used fluid mechanics modeling and an understanding of rarefied gas mechanics to calculate particle trajectories and evaluate the performance of various design iterations of the company's separator nozzle. The simulations showed improvement with each iteration, and the team offered recommendations to optimize the design.

The NMSBA project provided IDS an understanding of how its products work in different atmospheric pressures and environments. Since receiving assistance, the company has been awarded a $100,000 grant from the state of New Mexico and an additional $50,000 from NASA. Last year, IDS earned $2.5 million in revenue and hired additional employees, moving the total to 14.

Meet the Principal Investigator

Josh Hubbard
Sandia National Laboratories

Geovanny Zarceno, Research Assistant and **Richard Sayre**, Chief Science Officer, Mercury Bio.

PREDICTING SIRNA LEVERAGED PROJECT

Being able to access world-class scientists and the tools and facilities of national labs is a remarkable benefit to small businesses.

Bruce McCormick
CEO
Mercury Bio, LLC
fka Spartina Biotechnologies Inc.

Los Alamos, Sandoval, and Santa Fe Counties

Located in Santa Fe, Mercury Bio is developing a drug delivery platform and process to treat human diseases at a biomolecular, genomic level. Three other companies joined Mercury Bio to understand how small interfering RNA, called siRNA, could treat human disease: Richard Sayre Consulting LLC, Mountain Vector Energy LLC, and Pajarito Cloud Computing LLC.

siRNA that recognizes unique viral RNA sequences directs an enzyme to degrade the targeted viral genome sequence blocking viral replication. Mercury Bio needed to understand where on the viral RNA strand siRNA would be most disruptive. Running lab experiments on every disease and RNA sequence is too expensive and time consuming. Mercury Bio reached out to NMSBA for computational modeling. The company was paired with Garrett Kenyon at Los Alamos National Laboratory.

Kenyon and his team used artificial intelligence and machine learning to model the actions of siRNA in treating human diseases. The team utilized RNA data from a molecule structural database to train a machine learning algorithm pioneered at Los Alamos in order to develop a predictive model for how RNA folds. With this data, the team was able to evaluate where siRNA is most disruptive within the shape of each viral RNA molecule.

Completion of this NMSBA project granted Mercury Bio valuable technical insight into its products. The company raised $2 million in an initial investment round, hired a new CEO, scientists, and technicians, acquired more lab space, and are in the process of raising another $20 million. The company will continue working with Los Alamos in a TRGR Technology Readiness Initiative Project.

Meet the Principal Investigator

Garrett Kenyan
Los Alamos National Laboratory

Amaya Shiva,
CEO, Siddha Labs.

SIDDHA LABS

NMSBA gave us access to world-class experts; and when people hear that I'm doing research in partnership with a national lab, they listen. This is only just the beginning, thanks to NMSBA.

Amaya Shiva
CEO
Siddha Labs LLC

Santa Fe County

Siddha Labs is an ayurvedic herbal supplements company based in Santa Fe providing natural solutions for wellness needs ranging from immune and memory system support to tattoo aftercare.

As Siddha Labs continued to bring Eastern medical science and solutions to the Americas, Amaya Shiva knew she would need to gather data through a Western lens to evaluate her products. She reached out to NMSBA and was partnered with Armand Dichosa and his team from Los Alamos National Laboratory to perform proof-of-concept growth assays using a complex microbial community to determine microbial response to traditional Ayurvedic herbs.

Dichosa and his team demonstrated that certain bacteria appeared to positively respond to Triphala. Using the growth assays developed for the Ayurvedic herb study, the Los Alamos team will move forward with bacteria from the human microbiome to explore similar growth responses to other herbal supplements relevant to human health.

This research project is validating the efficacy of Ayurvedic medicines and supporting Siddha Labs' mission to create highly effective supplements that combine Eastern wisdom and Western science. As a result of this project, Siddha Labs was able to secure its first private investor, and is excited for the opportunity to bring on more partners. The company is looking forward to making a powerful impact on human health, furthering company growth, and creating more jobs in New Mexico.

Meet the Principal Investigator

Armand Dichosa
Los Alamos
National Laboratory

PROGRAM METRICS

VALUE OF PROGRAM ASSISTANCE IN 2022

In 2022, the state of New Mexico, along with Los Alamos National Laboratory and Sandia National Laboratories, invested **$4.55M**, helping **239** small businesses in **24** counties to solve technical challenges. The following table contains the number of small businesses that received assistance from NMSBA, dollar value of the assistance for calendar year 2022, and cumulative value from 2000 to 2022.

	Los Alamos*	Sandia	Total
Number of Small Businesses Served			
2022	**124**	**120**	**239****
Rural	62	42	103**
Urban	62	78	136**
2000 - 2022	**1,181**	**2,474**	**3,267****
Rural	799	1,447	2,012**
Urban	382	1,027	1,255**
Value of Assistance Provided			
2022	**$2,150,134**	**$2,399,992**	**$4,550,127**
Rural	$1,381,093	$1,252,402	$2,633,495
Urban	$769,041	$1,147,590	$1,916,632
2000 - 2022	**$32,199,137**	**$48,406,843**	**$80,605,980**
Rural	$26,192,427	$33,228,836	$59,421,263
Urban	$6,006,710	$15,178,007	$21,184,717

** Los Alamos began participating in NMSBA in 2007.*

*** Some companies are served by both laboratories.*

Note – In 2019, Santa Fe County moved from being a rural county to an urban county.

BENEFITS TO NEW MEXICO SMALL BUSINESSES

New Mexico small businesses achieved positive results after receiving technical assistance from NMSBA. Feedback from companies that participated in the 2021 economic impact client survey revealed that:

63%
DEVELOPED A NEW PRODUCT OR TECHNOLOGY

64%
IMPROVED OVERALL OPERATIONS

64%
EXPANDED OR IMPROVED A PRODUCT OR SERVICE

63%
BECAME MORE COMPETITIVE IN THE MARKETPLACE

61%
IMPROVED THE EXPERTISE OR CAPABILITIES OF EMPLOYEES

ACCOUNTABILITY & ECONOMIC IMPACT

NMSBA, enabled by the Laboratory Partnership with Small Business Tax Credit Act, is accountable to the state of New Mexico for its expenditures. NMSBA measures its economic impact through client surveys conducted by Research and Polling, Inc., and economic analysis provided by Robert Grassberger, PhD Economist.

CUMULATIVE ECONOMIC IMPACT FOR BUSINESSES FROM NMSBA PROJECTS	2000 - 2021*
Small Business Jobs Created and Retained	11,116
Average Reported Salary (2021)	$64,909
Increase in Revenue	$485,875,734
Decrease in Operating Costs	$275,973,900
Investment in NM Goods / Services	$183,643,608
New Funding / Financing Received	$248,676,530
Return on Investment (ROI)**	For every $1.00 of tax credit invested, the state receives a return of $1.60.

** Economic surveys are performed six months to one year after project completion.*

*** ROI is based on salaries of jobs created and retained.*

NMSBA identifies the areas of technical expertise that the national laboratories and their contractors utilized in NMSBA technical assistance projects, as well as the industry sector for the participating companies. The counties in which the small businesses are located are tracked to gain a better understanding of the reach of the NMSBA Program across the state.

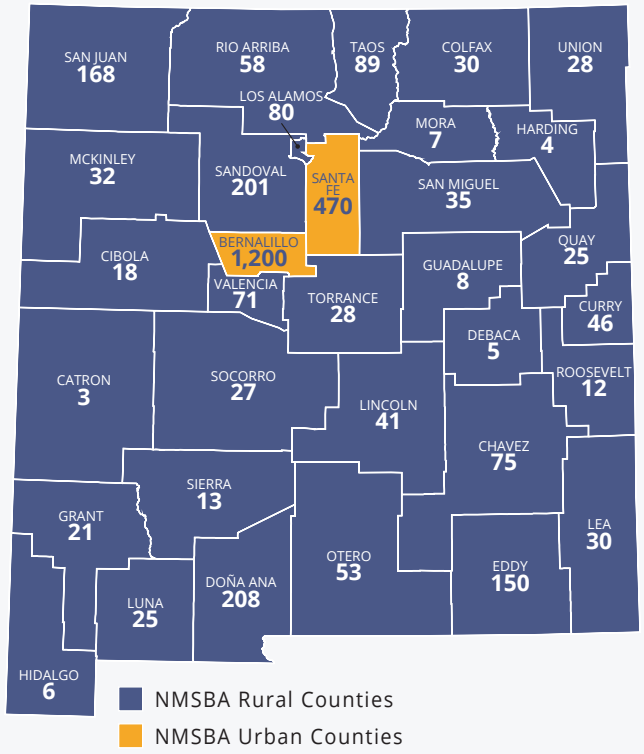
LABORATORY CAPABILITIES UTILIZED IN 2022

Manufacturing 29.7%
Engineering 18.4%
Advanced Modeling and Simulation 11.3%
Earth and Environmental Sciences 11.3%
Biological and Medical 10.4%
Micro-Nano Technology 4.2%
Materials Science 3.8%
Math and Computer Science 3.8%
Business Developement 3.3%
Energy 2.1%
Chemistry 1.7%

INDUSTRIES OF SMALL BUSINESSES SERVED IN 2022

Manufacturing 46.0%
Professional, Scientific, and Technical Services 32.6%
Agriculture and Natural Resources 10.1%
Other Services (except Public Administration) 4.2%
Oil & Gas, Utilities, and Mining 2.1%
Real Estate, Finance, Insurance, and Management Services 1.7%
Retail and Wholesale Trade 1.7%
Education Services and Health Care 0.8%
Media and Hospitality 0.8%

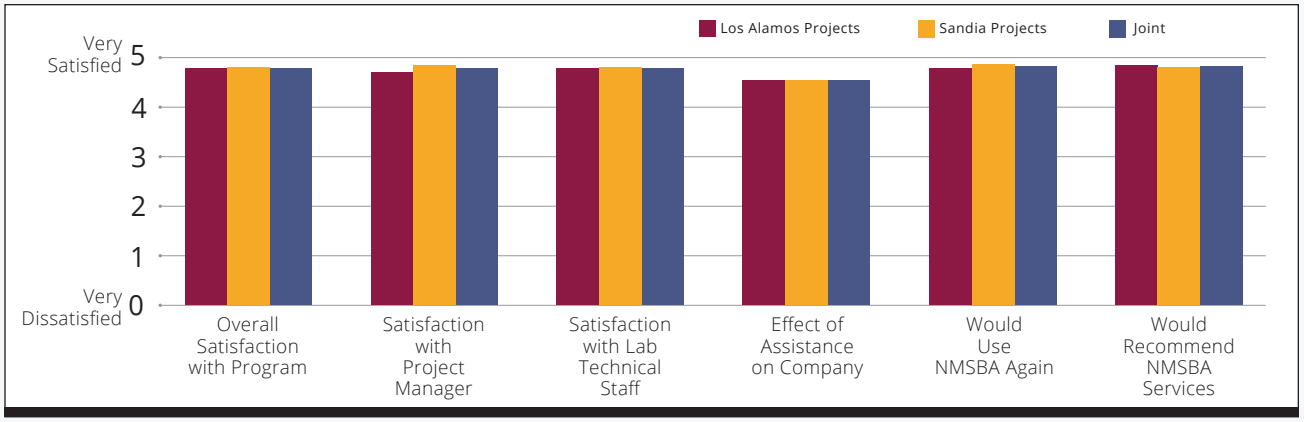
COMPANIES ASSISTED BY COUNTY 2000-2022



NMSBA has provided assistance to 3,267 small businesses in all 33 New Mexico counties during the life of the Program.

CUSTOMER SATISFACTION IN 2022

Each year, NMSBA surveys the participating businesses to learn about their satisfaction with the Program. In 2022, 87% of the businesses responded to the survey.



Carolyn White and **Josh White**, Owners, Syzygy Tile.

SYZYGY

NMSBA, with New Mexico MEP, has led us to be more efficient, not just through their recommendations, but by teaching us to think more critically about our business.

Josh White
Co-owner
Syzygy Inc.

Syzygy Tile specializes in manufacturing custom tile designs and glaze colors in Silver City. The company provides its products to customers nationally and globally. To keep up with demand, Syzygy needed to expand and streamline processes. Through Sandia National Laboratories, the NMSBA Program paired the company with Jeff Abrams and Wesley Eccles from the New Mexico Manufacturing Extension Partnership.

Abrams and Eccles identified that the company lacked the capacity and floor space to accommodate the needed expansion. The New Mexico MEP team developed a value stream map to optimize the layout for a new building before it was constructed. They also recognized that electricity costs were higher than they should be, and facilitated an application for the correct rate structure with the utility company. In addition, they identified an opportunity to utilize robotics to spray glaze onto the ceramic tiles. The team was able to design and demonstrate a robotic cell, enabling Syzygy to add the robot to its production line.

The initial results of implementing these recommendations have been that Syzygy has increased its productivity by 15%, changed its pricing structure to improve profitability, and hired three additional New Mexicans. The robotic cell will increase output by 600% and reduce lead times for the company. By automating the glazing process, Syzygy can now accept more projects and continue its growth.

Meet the Principal Investigators

Jeff Abrams
and Wesley Eccles
New Mexico Manufacturing
Extention Partnership

Grant County

Mike Fugagli, Project Compost Team Leader, New Earth and **Gordon West**, CEO, Trollworks.

TROLLWORKS

When you're a business from a small, rural community, people don't think much about it, but working with NMSBA has changed people's perspective of Trollworks.

Gordon West
CEO
The Trollworks LLC

Trollworks, located in Santa Clara, develops bioenergy and carbon sequestration systems. Trollworks' systems produce biochar, a charcoal-like substance made by cooking biomass in a controlled process called pyrolysis. The smoke produced from pyrolysis is burned in a common boiler, making useable heat energy. Biochar, a coproduct of the pyrolysis process, is then utilized to improve soil health while removing CO_2 from the atmosphere.

To commercialize its systems, Trollworks needs to develop markets for the biochar. Although there is an agricultural application, growers are hesitant to switch from traditional compost to biochar without the support of science and metrics. Characterizing the biochar also enables Trollworks to refine the system design. The ultimate objective is to create local circular economies restoring forests, soils, watersheds, and jobs.

To tackle these challenges, Gordon West connected with Sanna Sevanto from Los Alamos National Laboratory through NMSBA. Sevanto and her team performed research determining the effects of biochar produced by Trollworks' system on tomatoes and Swiss chard in agrivoltaic settings—areas simultaneously used for solar panels and agriculture. The Los Alamos team tested soil mixed with compost and biochar to measure plant growth and validated that the biochar improves plant and fruit growth as well as water-use efficiency, meaning less irrigation is needed.

While the company is still working on pilot projects to prepare for market introduction, the Lab-verified science and metrics NMSBA provided will increase market growth and consumer confidence in Trollworks as a trusted supplier.

Meet the Principal Investigator

Sanna Sevanto
Los Alamos
National Laboratory

Grant County

Kristen Worthington,
Owner,
Worthington Farms.

WORTHINGTON FARMS

NMSBA gives start-ups a great set of mentors and resources to answer questions about manufacturing techniques, working capital, and succeeding as an entrepreneur.

Kristen Worthington

Owner
Worthington Farms LLC

Nestled in Mesilla Park, Worthington Farms is a 10-acre pecan farm that produces a wide range of products from fresh pecans, including beauty products, baking ingredients, desserts, and flavored pecans. The company has a goal to promote and capitalize on the versatility of the pecan by expanding its operations.

To help identify the shelf life of its products for retail expansion, the company reached out to NMSBA. Los Alamos National Laboratory connected Worthington Farms with Kristin Morehead of the Arrowhead Center at New Mexico State University.

Morehead, in collaboration with faculty member Efren Delgado and student researcher Dante Rojas-Barboza, performed a shelf life analysis on Worthington Farms' pecan flour, pecan butter, and pecan oil. They specifically investigated changes in water activity, acidity, and microbial growth over several months to determine stability, safe shelf life, and use-by dates for each product. The team also supplied additional market research and resources for the company to use as it takes its products to retailers and farmers markets around New Mexico.

After completion of the NMSBA project, Worthington Farms hired three new employees, increased sales by 40%, brought on 17 wholesale accounts, and received an investment of $30,000 from the New Mexico Job Training Incentive Program. The demand for its pecan products has increased to the point that it needed to buy additional pecan supply to fulfill orders.

Meet the Principal Investigator

Kristin Morehead
New Mexico State University

Doña Ana County

LEVERAGED PROJECTS

	DESCRIPTION	BUSINESS PARTICIPANTS	COUNTIES	FUNDING
Advanced RNA				
Sandia	To test and deploy the RNA, it must be formulated into a nanoparticle and coated with an appropriate lipid to stabilize, solubilize, and deliver it. The microfluidic discovery platform chips can produce RNA-containing lipid nanoparticles; the RNA was supplied by the companies. The Labs attempted to transfer these designs to a system where fluids contact only glass and stainless steel to allow for steam or chemical sterilization. The Labs tested the thermal stability of the lipid nanoparticles.	Biuveris Inc. NTx Inc. (Nature's Toolbox) NTxBio Inc. VM Technology Inc.	Sandoval Santa Fe	**$118,600**
Algae Biofuel Earth Pond Liners				
Los Alamos	The Lab provided assistance with algae growth management, data acquisition, and with an evaluation of LithTec™ Earthliner performance. This work was completed using premier Los Alamos lipid-producing strains of algae and by evaluating the structural and possible chemical advantages of Earthliners over synthetic plastic liners in an outdoor environment.	Bionic IP Holdings LLC GM Emulsion Havens Transport LLC Lithified Technology Group LLC Palace Canyon Properties LLC	San Juan Santa Fe	**$107,900**
Cell Culture				
Los Alamos	The Lab assisted in validating the companies' chemically defined stem cell culture medium formula by experimenting on different cell types.	Alpha Arietis LLC Daedalus Technology Group LLC Enchanted Land Properties LLC FLXD Reytek Equipment LLC Science Business Software Inc.	Bernalillo Sandoval Santa Fe	**$159,800**
Disinfectant Fog				
Sandia	The Labs studied droplet size, electrostatic characteristics, and settling time of aerosolized hydrogen peroxide through an HVAC system to understand the impacts on pathogen disinfection in a room.	Build With Robots Inc. FatPipe Rio Rancho LLC Painting Bots Inc. The Center for Bioscience LLC	Bernalillo Sandoval	**$98,700**

Los Alamos National Laboratory and Sandia National Laboratories provide technical assistance for both individual and leveraged NMSBA projects. The following is a listing of this year's leveraged projects.

	DESCRIPTION	BUSINESS PARTICIPANTS	COUNTIES	FUNDING
Emergency Response				
Sandia	The Labs provided modeling and testing of various high energy radiation effects on the companies' electronic circuit to analyze changes in the circuit's performance.	Aquila Inc. Gold Standard Radiation Detection Inc. Integrative Sourcing LLC Korwest	Bernalillo	**$70,600**
Geothermal Reservoir Modeling				
Los Alamos	The Lab worked with the businesess to develop a geothermal reservoir model using shared datasets. The work focused on building a computational grid and performing preliminary thermal flow and pumping simulations. The Lab also evaluated thermal and flow parameters used in the modeling by comparing simulations results to field observations.	Earth System Sciences LLC Jhus Canyon Construction LLC Lightning Dock Geothermal, HI-01 LLC	Hidalgo Santa Fe	**$47,100**
Greenhouse Gas Reduction				
Sandia	The Labs provided technical assistance to help determine if organic fertilizers can reduce greenhouse gas emissions and sequester carbon into soil. The objective was to gain understanding of comparative greenhouse gas emissions, water storage capacity, and carbon soil storage of organic fertilizers compared to conventional synthetic nitrogen fertilizers.	Drought Adaptation Industries Rancho Alma Linda Tucumcari Bio-Energy Company	Otero Quay	**$98,800**
High LIDT Metasurface Phase Retarder				
Sandia	The Labs provided process development and testing for the fabrication of a metamaterial optic which will eliminate thermal effects in high-powered lasers that would otherwise cause substantial degradation in beam uniformity and power output. The Labs' expertise in nanotechnology and the use of its facilities is paramount to the realization of this technology.	CNC Machining InSync Inc. Voss Scientific Inc. Voss Scientific LLC	Bernalillo	**$70,400**
Hydrogen System				
Sandia	The Labs modeled feasible safety risk scenarios for the companies' hydrogen systems. Risk scenarios included potential leaks and releases that could be caused by component failures due to various causes. Scenarios were evaluated for different types of ramifications related to temperatures, hydrogen concentrations, heat fluxes, or other parameters of safety concern.	A-1 Machine Inc. BayoTech Inc. Merrion Oil & Gas Process Equipment and Service Company Inc.	Bernalillo San Juan	**$116,100**

LEVERAGED PROJECTS CONTINUED

	DESCRIPTION	BUSINESS PARTICIPANTS	COUNTIES	FUNDING
Impact Analysis				
Sandia	The Labs provided results from SIERRA/SolidMechanics impact simulations of a Finite Element Analysis model of NASA's 1 kW Kilopower nuclear power system. The reactor power system impacted a variety of soft and yielding target media represented with smoothed particle hydrodynamic glyphs.	Little Prairie Services Space Nuclear Power Corporation Surreal Studios	Los Alamos Santa Fe	**$79,100**
IoT Solar Arrays				
Sandia	The Labs provided evaluation and testing on the companies' cybersecurity device and software to protect grid connected photovoltaic solar panel systems.	Guardian Sensors Inc. Noventum Custom Software	Bernalillo	**$38,100**
Laser-based Detection of Viruses				
Los Alamos	The Lab assisted the businesses by providing micro-biological expertise, samples for prototype calibration, and collaboration. The Lab supported the businesses' development of a commercial diagnostic instrument for the real-time laser-based detection of COVID infection using only paper filters and power.	Creative LIBS Solutions LLC Photon MediLytics	Sandoval	**$59,200**
PainScan Force Measurement				
Sandia	The Labs implemented a testbed for fingertip pressure sensing where these and other methods could be objectively evaluated and compared in a simulated clinical situation. Tests were performed and data was provided to the companies that may inform their choice of sensing methodology. The Labs also consulted on the instrumented grip device for pain assessment, and the 3D tracking of the glove relative to the patient's body.	Ingenuity Software Labs Just Health Care LLC Lynn Technical Services LLC	Bernalillo	**$59,100**
Particle Tracking				
Los Alamos	The Lab provided unique expertise by modeling particle trajectories in acoustically driven flow cells.	Andrew Shreve Consulting LLC BennuBio Inc. DarklingX LLC	Bernalillo Los Alamo Santa Fe	**$39,700**

	DESCRIPTION	BUSINESS PARTICIPANTS	COUNTIES	FUNDING
Passive Heat Exchanger				
Sandia	The Labs provided technical consulting and modeling on the companies' thin-shelled vertical heat exchanger design using computational fluid dynamics coupled with thermal heat transfer. The assistance includes the model of dimpling for enhanced turbulence and heat transfer, as well as passive heat conduction, whereby the ground acts as the ultimate heat sink.	C Johnson Development Company LLC New Dryas Energy LLC Rumor Brewing Company LLC	Bernalillo	**$49,400**
Predicting siRNA				
Los Alamos	The Lab used its expertise in artificial intelligence and machine learning to assist with modeling the actions of siRNA for treating human diseases.	Mercury Bio fka Spartina Biotechnologies Inc. Mountain Vector Energy LLC Pajarito Cloud Computing LLC Richard Sayre Consulting LLC	Los Alamos Sandoval Santa Fe	**$118,500**
Safe Station Mechanisms				
Sandia	The Labs provided design consultation on the companies' physical cybersecurity Tech Locker. Sandia investigated potential locking/securing mechanisms with potential intrusion detection incorporated. Tech Locker cooling options and requirements for several configurations were also explored.	Paper Plane Branding and Marketing Safe Station	Bernalillo	**$40,000**
Ultraviolet Filtration Modeling				
Sandia	The Labs conducted experiments using HEPA/UV-C to investigate the impact of UV-C irradiation and a tool was developed for estimating the UV-C dosage necessary to inactivate airborne pathogens. Fluid dynamics modeling done by the Labs showed that certain building architectural features, such as building height, window position, and heating/ventilation location, increase the ability of a building to generate natural circulation air currents that, in combination with UV-C/HEPA systems, can reduce the level of air pathogens.	Bright Holdings LLC F & J Electric LLC Temper Mechanical and Plumbing Xpress Construction and Services LLC	Bernalillo Valencia	**$72,100**

INDIVIDUAL PROJECTS

Bernalillo

Addictive Ink
Advanced Optical Technologies Inc.
AlbuGierke Environmental Solutions LLC
AWS Bio-Pharma Technologies
Backerworks Manufacturing LLC
BeeCleanSpot LLC dba Bee Clean
Blue Eye Soft Corporation dba Blue Space
Bluecom Systems & Consulting LLC
Bosco Tech
Continental Machining Company
Cornivore Popcorn Company
CSolpower LLC
Dark Sea Industries LLC
Donaldson Engineering Inc.
Electric Motor Company Inc.
Enthentica Inc.
Eternal Stone
Excel Manufacturing
EXHIB-IT!
Filtravate Inc.
Finches LLC
Garcia Enterprises Inc. dba The Original Garcia's Kitchen
Goodman Technologies LLC
Gratings Inc.
Hawk Spider Energy Corporation
HT MicroAnalytical Inc.
I AM Machining
IC-Safety LLC
Inspyrd Products Corporation
Integrated Deposition Solutions
JCNC LLC
LAD Engineering LLC
Lavender Road Handcrafted Luxury LLC
LifeScience Testing and Analysis LLC
Los Poblanos Historic Inn & Organic Farm
Ludus Brands dba FanSeat
Memzyme LLC
Mesa Alta Research LLC
Mimi Green
Mother Trail LLC dba Mother Trail Beverage Company
New Mexico Sabor LLC
NobHill Therapeutics
OBTC Warehouse LLC dba Old Barrel Tea Company - ABQ
OptiSource LLC
ParadOxy LLC
Pebble Creek Lighting
Pomp & Circumstance LLC
Precision Solar Technologies Corporation
R3 Technologies LLC
Radiant Technologies Inc.
Radiation Detection Solutions LLC
RadPhysics Services LLC
RingIR Inc.
Rose Nodine Bryant dba Dragonfly Elementals
Sandia Electro-Optics Corporation/ Unique Services
Sandia Pet Products LLC/ V. F. Pet Products LLC
Segura Enterprises LLC
Sentient Data Systems LLC
Sigma Advanced Technologies LLC
Southwest Composite Works/ Southwest Pattern Works Inc.
Steel Jupiter Inc.
Submaterial LLC
Theta Plate Inc.
Toltec Industries Inc.
Trail 9 Outdoors LLC
Unirac Inc.
Vital Grow Inc.
WaveOn LLC
Wise Choice Foods
World Exhibition Center LLC

Chavez

Agape Real Estate

Cibola

Chavez Plumbing and Supply LLP

Colfax

Angel Fire Real Estate LLC
Angel Fire Resort Operations

Curry

Petricor LLC

Doña Ana

Andele's Tortilleria de Mesilla LLC dba Ol' Gringo Chile Company
Artifacts Unlimited Industries
Indie LLC dba Bender Innovative Solutions
Project Maldonado
Roper Solutions Inc.
Worthington Farms LLC

Grant

Syzygy Inc.
The Trollworks LLC

Los Alamos

AllerPops Corporation
BetterScience Works LLC
HyPwr LLC
Innovative Crop Chem LLC
Muhlala Turbine LLC
SIVI LLC dba CarbonACE.com
Tibbar Plasma Technologies Inc.
Trenza Inc.
Undesert Corporation Inc.

Luna

NewDataStrings LLC

McKinley

Church Rock Development

Navajo Spirit Southwestern Wear

Mora

CattleXpressions

Otero

A & M Meat Processing LLC

Emerging Technology Ventures Inc.

High Rolls ClayWorks

NowClean LLC

Quay

Energy Related Devices Inc.

Rio Arriba

Canton Custom Instruments LLC

Freshies of New Mexico LLC

ORC Tech LLC

Vela Vineyards/Sierra Vista Farms

Velarde Vines

San Juan

ABC Canvas Inc.

Affordable Blinds LLC

A-Plus Well Service Inc.

Aztech Power and Energy LLC

Bisagra LLC

Brady Trading LLC

Breathable Moments Travel LLC

DragonFire Technologies LLC

Haul Kings LLC

Hauling Accessories LLC

Industrial Cooling Exchanger

J & T Distributing LLC

Jack's Plastic Welding Inc.

Largo Tank and Equipment

Power and Control Solutions Inc.

R & T Holdings LLC

Teresa Lackey dba Valley Mills

The Original Sweetmeat Inc.

San Miguel

San Miguel Sun Dwellings

Seed + Stone LLC

Sandoval

Absolute Concept Designs

DHF Technical Products LLC

Eagle Eye Spatial Solutions LLC

EarthTek LLC

Mezel Mods

Paulita's New Mexico LLC

Pfeifer Studio

Quantum Laboratory of New Mexico LLC

Seed International Inc.

Tamaya Ventures

Vamco LLC

Santa Fe

Acoustic Biosystems Inc.

Beck & Bulow

Better Music Boxes

Earth Traveler Teardrop Trailers LLC

Evolving Energy

Excedere LLC

Fault Tolerant Technology LLC

Gonzo Farms LLC

iBeam Materials Inc.

Innate Immunity LLC

Keystone Restoration Ecology Inc.

Kinetic Power LLC

La Puerta Originals

LatticeX

Leaf & Hive LLC

Light Styles of Santa Fe LLC

MT Agricultural Enterprises

Ocean-based Climate Solutions Inc.

Parting Stone Inc.

Positive Energy Solar aka Positive Energy Inc.

Rachel Wood Consulting

Siddha Labs

Social TecKnowledgy LLC dba Fidelity EHR

Stephen Auger Laboratory LLC

TARTLE

UHV3D Inc.

Western Ecology LLC

Woodruff Scientific Inc.

Sierra

St. Cloud Mining Company Inc.

Socorro

Armijo Farm

Taos

Aspena LLC

Diamond Sow Garden

Sangre De Cristo Initiative

Self-Powered Organics LLC

Torrance

Armaspec

Valencia

AC Disposal Services

Crating International LLC

G90 Manufacturing

Sisneros Bros. Mfg. LLC

BEN LUJÁN AWARD

Mercury Bio
Team Members.

PREDICTING SIRNA LEVERAGED PROJECT

This year the Predicting siRNA Leveraged Project won the Honorable Speaker Ben Luján Award for Small Business Excellence for demonstrating the most economic impact. Mercury Bio, Richard Sayre Consulting, Mountain Vector Energy, and Pajarito Cloud Computing collaborated with Los Alamos National Laboratory on the project focused on advancing highly targeted delivery of drugs to specific cells.

The NMSBA project allowed the partners to do very elemental research on new technology that uses extracellular vesicles that are loaded with either nucleic acids, such as RNA, or small molecule drugs for targeted delivery to receptors on specific cells. Targeted delivery reduces side effects resulting from the toxicity of certain drugs, including some used for chemotherapy.

The expertise at Los Alamos in advanced theoretical biology, as well as ita supercomputing hardware, led to the positive collaborative project results. The project developed software programs to design, in silico, small interfering RNAs that were more efficacious in silencing targeted genes than programs previously used in the past, saving time and resources to accelerate therapeutic RNA drug development.

Impact

Mercury Bio, the lead company on the project, credits the results of the NMSBA research project with helping them establish credibility within the scientific and investment communities. This project has also led to the company raising more than $2 million, hiring 10 more scientific staff members for high-paying jobs, and moving its technology toward commercialization.

Looking Ahead

Mercury Bio is looking to attract potential partners to license its technology and collaborate with them on developing drugs. A Cooperative Research and Development Agreement and TRGR Technology Initiative Project with Los Alamos continue to advance the technology. Mercury Bio expects to enter into another capital raise, move into a larger facility, and hire many more employees in the second half of 2023.

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New Mexico Economic Development Department

Adriene Gallegos
New Mexico Small Business Development Center Network

Alex Greenberg
New Mexico Economic Development Department Office of Science and Technology

Karl Halpert
Private Label Select Ltd.

John Heaton
City of Carlsbad

Cliff Hudson
Emerging Technology Ventures, Inc.

Thomas Jensen
Entrepreneur

Ron Manginell
Sandia National Laboratories

Duncan McBranch
Los Alamos National Laboratory

Vanessa Roanhorse
Roanhorse Consulting

Dan Sanchez (ex officio)
U.S. Department of Energy
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Sandia National Laboratories

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New Mexico Manufacturing Extension Partnership
Los Alamos National Laboratory

Jeffrey Hall
New Mexico Manufacturing Extension Partnership
Los Alamos National Laboratory

Judy Hendricks
Sandia National Laboratories

Mariann Johnston
Los Alamos National Laboratory

David Kistin
Sandia National Laboratories

John Martinez
Sandia National Laboratories

Genaro Montoya
Sandia National Laboratories

Lucas Reiglesperger
New Mexico Manufacturing Extension Partnership
Los Alamos National Laboratory

John Rogers
New Mexico Manufacturing Extension Partnership
Los Alamos National Laboratory

Wendy Rue
Sandia National Laboratories

Jeanette Trujillo-Rondeau
Los Alamos National Laboratory

Linda von Boetticher
Sandia National Laboratories

Joseph West
Los Alamos National Laboratory

Julia Wise
Los Alamos National Laboratory

PERSPECTIVES ANNUAL REPORT TEAM

SANDIA NATIONAL LABORATORIES

David Kistin
Manager

Genaro Montoya
Program Leader

Sharon Evans
Financial Administrator

Linda von Boetticher
Annual Report Project Manager

Vickie Aranda
Designer

Ellen Cline
Editor

Bret Latter
Photographer

LOS ALAMOS NATIONAL LABORATORY

Mariann Johnston
Deputy Program Manager

Julia Wise
Program Lead

Xen Stanhope
Finance

Hannah Conrad
Writer

James Blake
Photographer

David Jan Woodfin
Photographer

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