

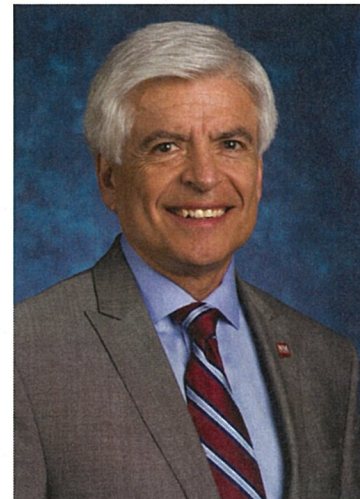
NMSU: Economic and Rural Development Impact

Luis Cifuentes, Ph.D.
Vice President for Research

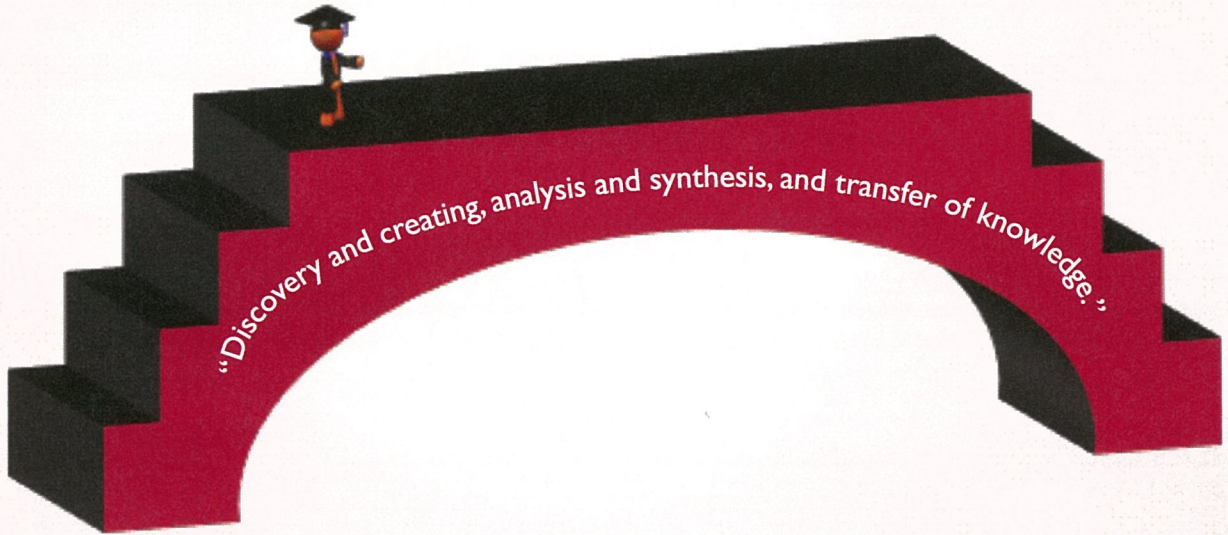


“Why would a land grant university care about research? The primary purpose of a university: Discovery and Creating, Analysis and Synthesis and the transfer of knowledge. Our research programs push the frontier of knowledge to enable elegant solutions in the market place. With that as our domain, we at NMSU can create economic development and wealth creation.”

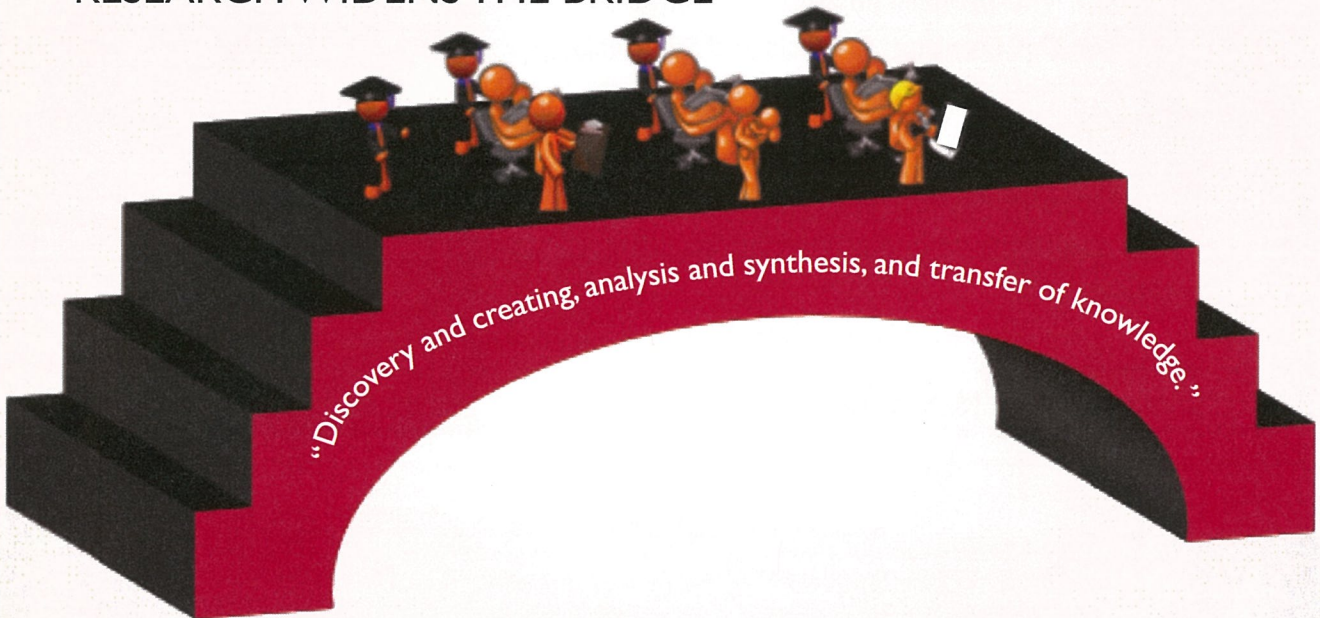
Dr. Dan E. Arvizu
Chancellor New Mexico State University



UNIVERSITIES ARE A BRIDGE FROM POTENTIAL TO ECONOMIC OPPORTUNITY



RESEARCH WIDENS THE BRIDGE



Rankings of Impact (<https://rankings.nmsu.edu/>)

National Science Foundation: No. 1 in the nation among peers for science and engineering funding

- NMSU leads all of America's minority-serving institutions in federal obligations for science and engineering activities, according to a report from the National Science Foundation's National Center for Science and Engineering Statistics

Brookings Institution No. 2 nationally for research and improving lives

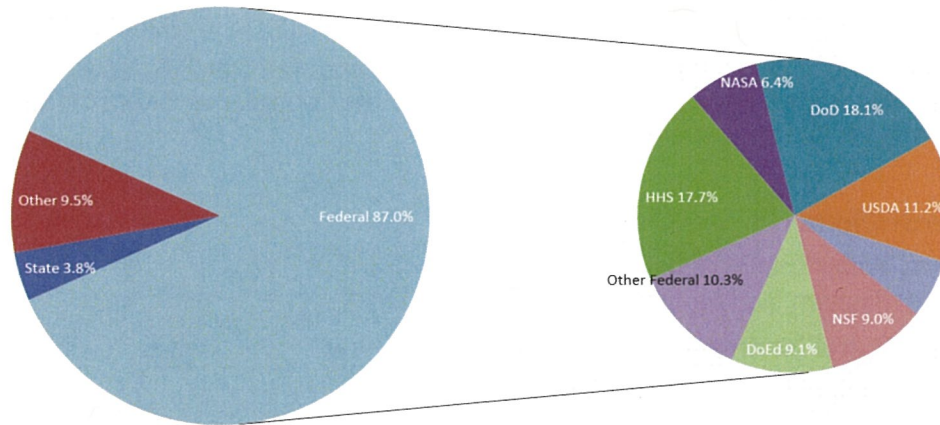
- NMSU has been listed as a leader in equal access to higher education, according to a report that gave NMSU the second-highest score in the nation as a public university that provides opportunities for social mobility to students and produces valuable research.

Social Mobility Index Ranked in top 12 percent for improving students' social mobility

- According to CollegeNET's Social Mobility Index ranking, NMSU ranks in the top 12 percent for schools that help improve their students' economic status. The rankings are based on tuition, economic background, graduation rate, early career salary and endowment

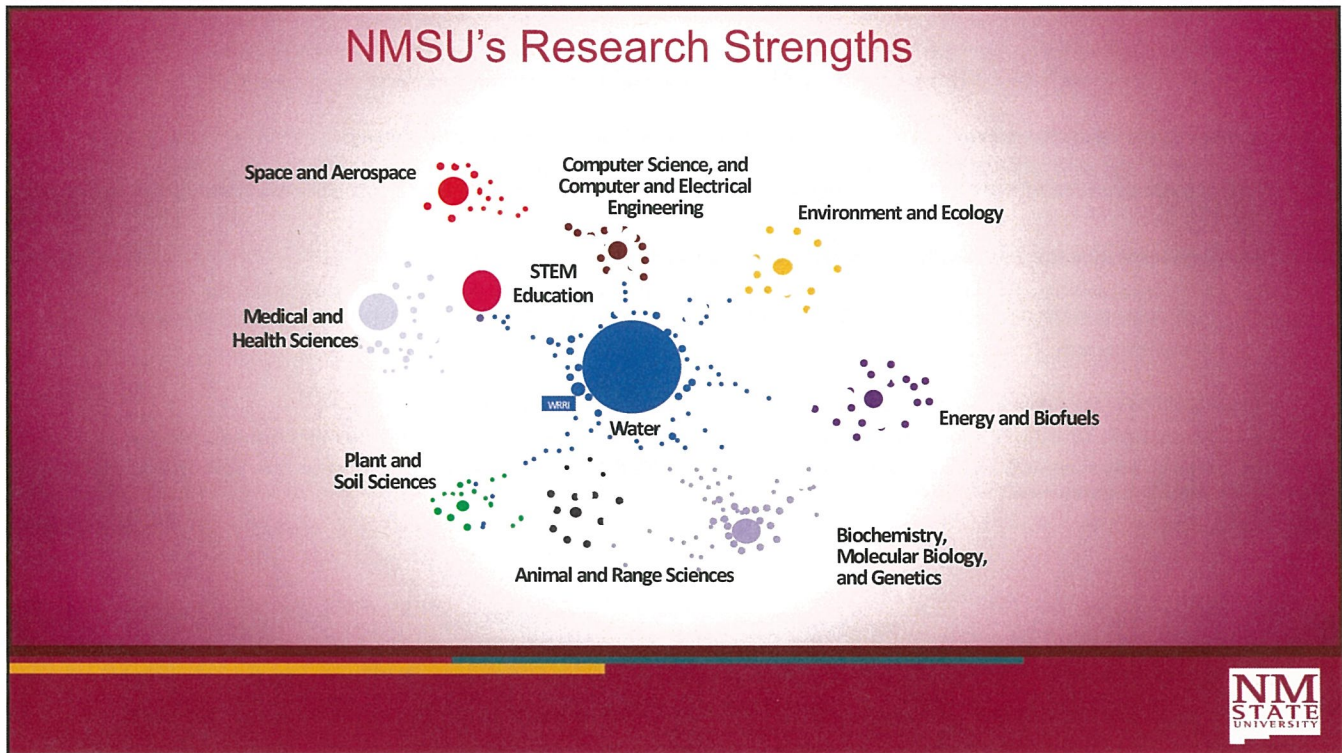


2018 Awards by Sponsoring Agency



Total Awards: \$94,099,424.65





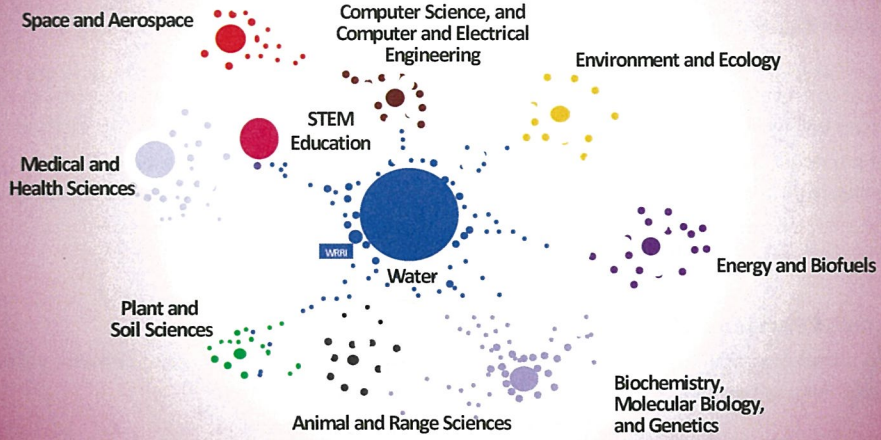
New Mexico Water Resources Institute

NMSU possesses comprehensive capabilities in water-related research, education, outreach, and economic development. More than 80 faculty, researchers, and staff from 15 departments within six colleges, as well as the agricultural science centers and the Cooperative Extension Service, offer extensive expertise and experience in water.

Water Research Efforts

- Agricultural Water Use Efficiency
- Watershed, Riparian, and Aquatic Systems
- Water Quality and Treatment such as Desalination
- Water Informatics using Geospatial Techniques

NMSU's Research Strengths



Agricultural, Consumer and Environmental Sciences

ECONOMIC AND COMMUNITY DEVELOPMENT



ACES – PROGRAMS OF IMPACT

- **Pesticide Safety Education Program**
- The Pesticide Safety Education Program at NMSU promotes the responsible use of pesticides through educational resources and training. Training covers a broad range of topics on human safety and environmental issues. **The program reaches over 500 individuals annually.** Workshop evaluations indicate that 97% of participants learned a new skill that will assist them when applying pesticides, and 75% of participants learned a new pest or plant management practice that will decrease pesticide applications. **Recertifying 350 current pesticide applicators and training 150 new license holders with an average annual salary of \$34,570 this program contributed over \$17,000,000 to New Mexico's economy.**
- **Sugarcane Aphid Pest Management in Sorghum**
- A sugarcane aphid management program is being developed based on biological control, cultural controls and host plant resistance. Implementation will **save growers in New Mexico \$4.6 Million per year in reduced costs and losses as well as \$20 Million in adjacent Texas counties.**



ACES - PROGRAMS OF IMPACT

- **Beginning Farmers and Ranchers in New Mexico's Pueblos**
- Agriculture has played an important role in the survival of the Pueblo People of New Mexico within the past eight hundred years and greatly contributes to their custom, culture and tradition. Today, their custom, culture, traditions and economic stability are threatened by lack of agricultural technical and educational assistance. **CES RAIPAP specialists through the assistance of the USDA NIFA BFRDP, have trained over 160 Native American beginning farmers and ranchers within the northern and southern pueblos,** thus increasing farm income and maintaining cultural values and tradition.
- **Sustainable Farming Techniques in Northern New Mexico**
- Success in utilizing sustainable farming techniques in northern New Mexico is challenging due to many obstacles, including a short growing season. Greenhouse construction is very expensive and many small scale farmers cannot afford to invest due to these prohibitive costs. The use of hoop houses or high tunnels has been demonstrated to be cost effective for small scale farmers and can provide extended growing season for various high value cash crops. **CES RAIPAP specialists have assisted over 1400 New Mexico producers in building high tunnel/hoop house units and by extending the growing season,** thus improving annual income through additional crop production.



ACES-PROGRAMS OF IMPACT

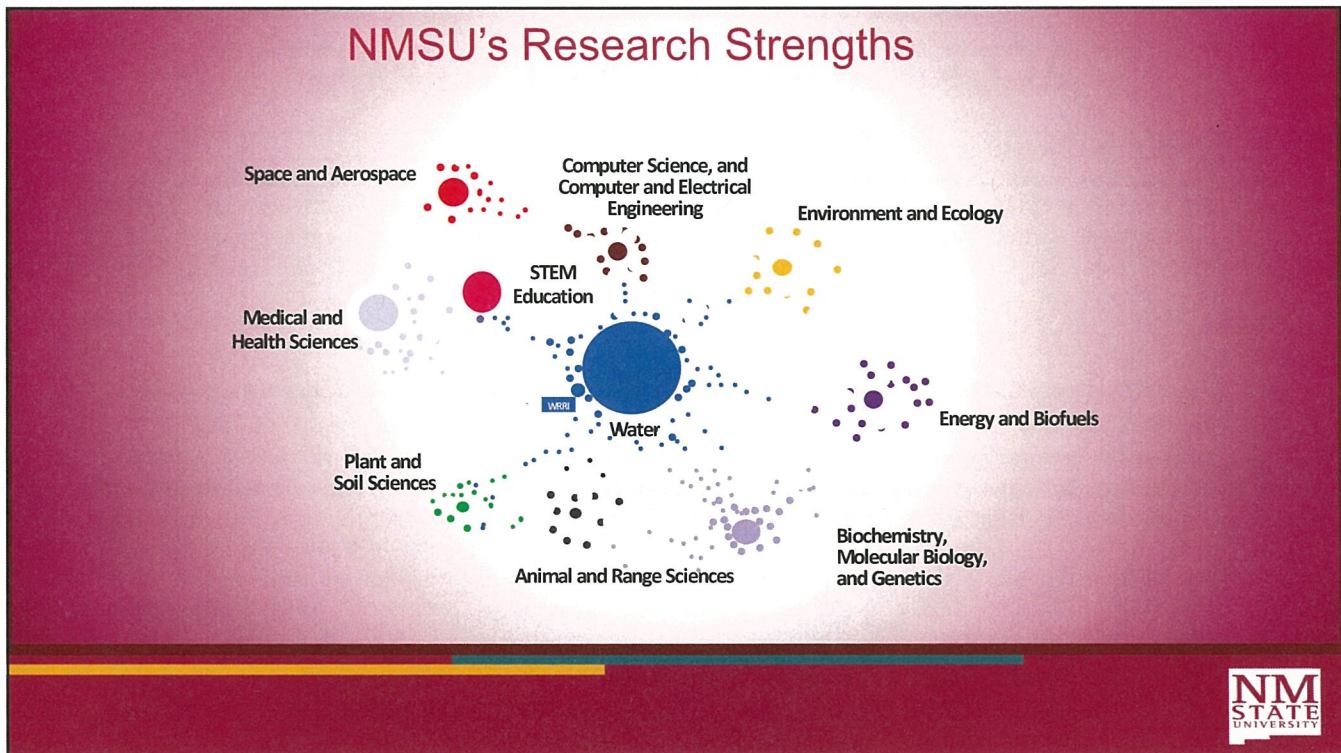
- **Stronger Economies Together (SET)**
- SET is a USDA Rural Development program in partnership with the nation's Land Grant Institutions. The SET program seeks to address the economic development challenges that rural communities and areas face today by encouraging, facilitating and supporting efforts to design and implement multi-county economic development plans and projects that strategically build on the current and emerging economic strengths of that region. **New Mexico State University has facilitated the establishment of nine SET regions involving 32 of the state's 33 counties.**
- **USDA AFRI Organic Transition Grant: Improving the Competitiveness of Limited Resource Farmers and Ranchers (LRFR) in Southern New Mexico** Through the Adoption of Organic Practices. The goal of this project is to improve the competitiveness of Limited Resource Farmers and Ranchers (LRFR) in Southern New Mexico through the successful adoption of organic farming and ranching practices. Over the course of the three-year project, the **Organic Transition Team (OTT) and project reached an estimated 850 producers, local municipality's, and local and state government agency** with information and education material pertaining to Organic Farming and Ranching best practices, and certification requirements.



Plant and Soil Science

- Development and Evaluation of Methods for Microbiological and Chemical Analysis
- Transcriptome Sequencing of the New World Miracle Trees (Leucaena, Leguminosae)
- Comprehensive and Effective State Pesticide Regulatory Program
- Population Rootstock Development
- Strengthening Public Corn Breeding to Ensure that Organic Farmers have Access to Elite Cultivars

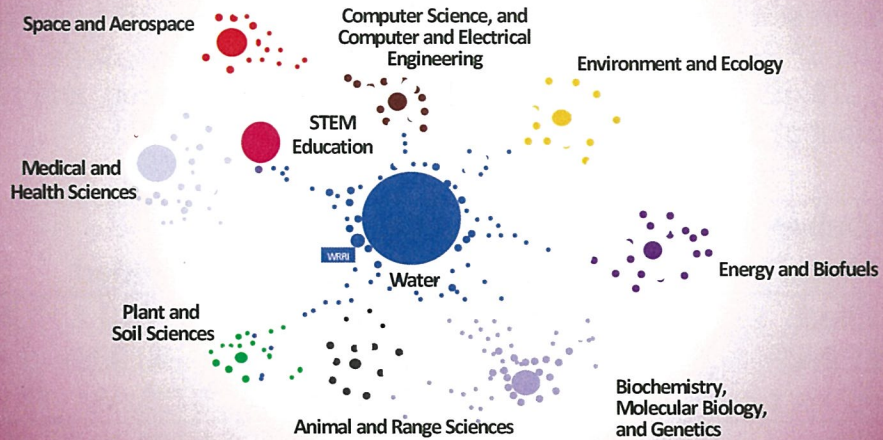




Medical and Health Services

- Emerging Pathogens: Synthesis of antiviral drugs and biology and gut ecosystem of mosquitoes
- Cancer Research: Cancer therapies, breast cancer, cell cycle and signaling, and tumor genesis and growth patterns
- Neuroscience: Nervous system and sensory organs, hearing and balance, and neuroscience and motor systems
- Public Health: Obesity, health behavior, health psychology, health communications, and medicinal plants
- Biomedical Education and Training

NMSU's Research Strengths



College of Education STEM Outreach Center

STEM Outreach is an organization that provides:

- **Out-of-school time programs** for kindergarten – 8th grade students
- **Teacher professional development** to all participating afterschool program teachers.
- **Curriculum and educational resource kits** to assist in teaching the content of each afterschool program.
- **Parent and family outreach** through workshops and family-based events.
- Free STEM-based **summer camps** at select 21st Century Community Learning Centers.
- **Quantitative and qualitative assessments** gathered throughout the school year from parents, students, and teachers.



College of Education: STEM Outreach Center

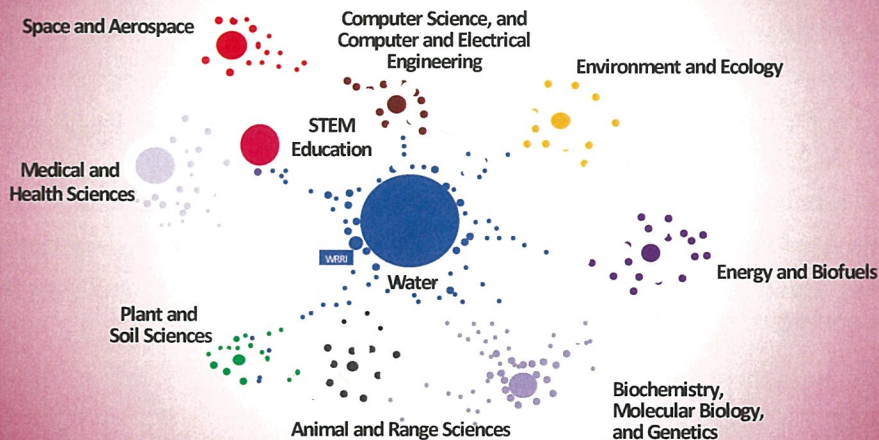
The STEM Outreach Center’s activities for 2018 will contribute 36.4 jobs to the local economy. The STEM Outreach Center will also contribute to the Doña Ana county economy \$1,278,592 in Labor Income, \$1,792,110 in Value Added, and an overall economic output of \$2,702,267.

STEM Outreach Center Economic Impact 2018

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	24.1	851,384.1	995,640.2	1,328,530.7
Indirect Effect	1.6	\$58,401	\$90,939	\$168,406
Induced Effect	10.7	\$368,807	\$705,531	\$1,205,331
Total Effect	36.4	\$1,278,592	\$1,792,110	\$2,702,267



NMSU’s Research Strengths



NMSU Astronomy Operates APO

- Continued operation of the observatory provides \$2.2 million in local salaries annually, with APO employing ~30 people plus additional \$200,000 in annual purchases and services to the local economy.
- Nearly all APO staff live in rural areas surrounded by the forest. Many have professional spouses that make up staff and volunteers in the area. The local volunteer fire department is manned entirely by staff at the observatory. Many staff provide hours of community education to local school children through organized events, school talks and on-site Observatory programs. Several staff members are also instructors at the local community college.
- Observatory construction costs have brought in > \$ 8,000,000 to local businesses, and APO has another \$700,000 planned in next 2 to 3 years
- The State of NM provides ~ \$74k each year toward NMSU's participation in its scientific activities. NMSU's annual PSO/ARC and APO/SDSS participation costs exceed this amount.



NMSU UAS Test Site

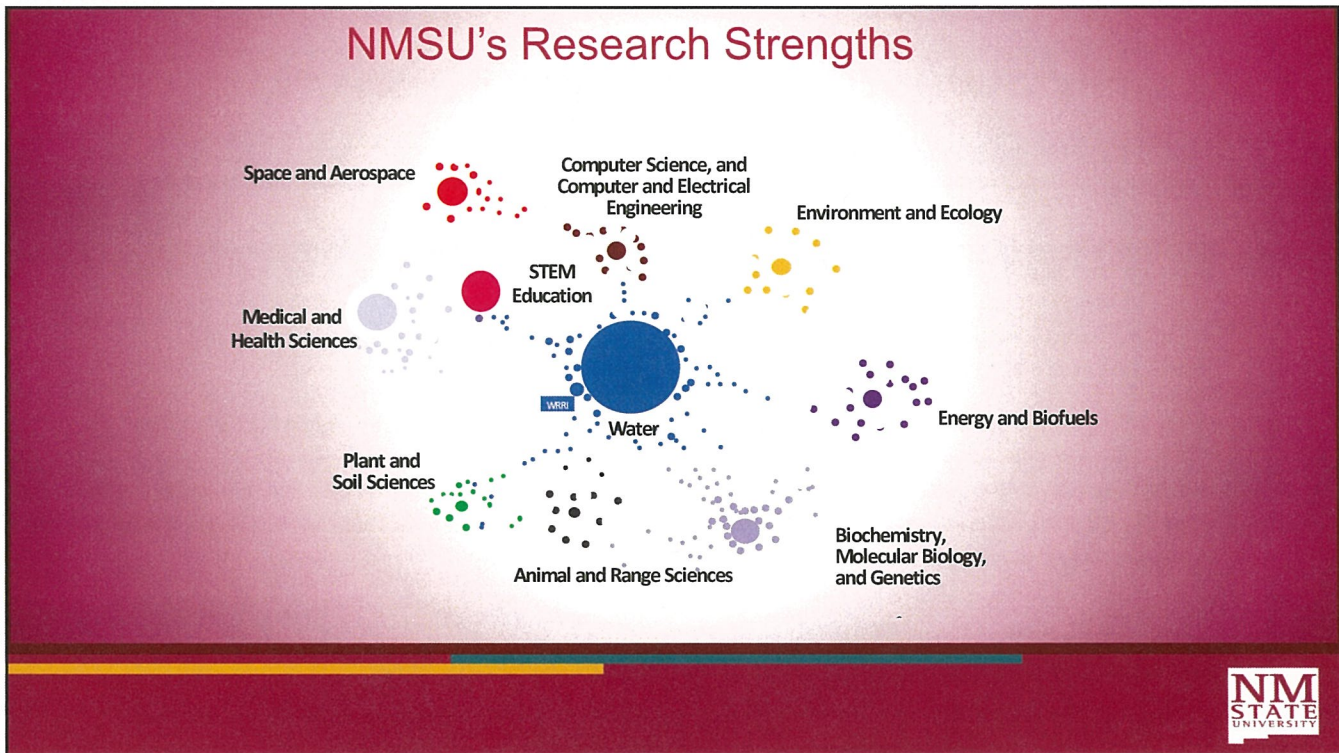
New Mexico UAS Test Site has relevance to the state of NM and rural economic development include cargo UAS flight testing, MALE (Mid Altitude Long Endurance) flight operations, and critical infrastructure inspections

- Infrastructure – Electrical Utilities and Dam Inspections
 - Mapping and modeling
 - Geolocation mapping of assets
 - Detailed safety inspections
 - Emergency Response Planning



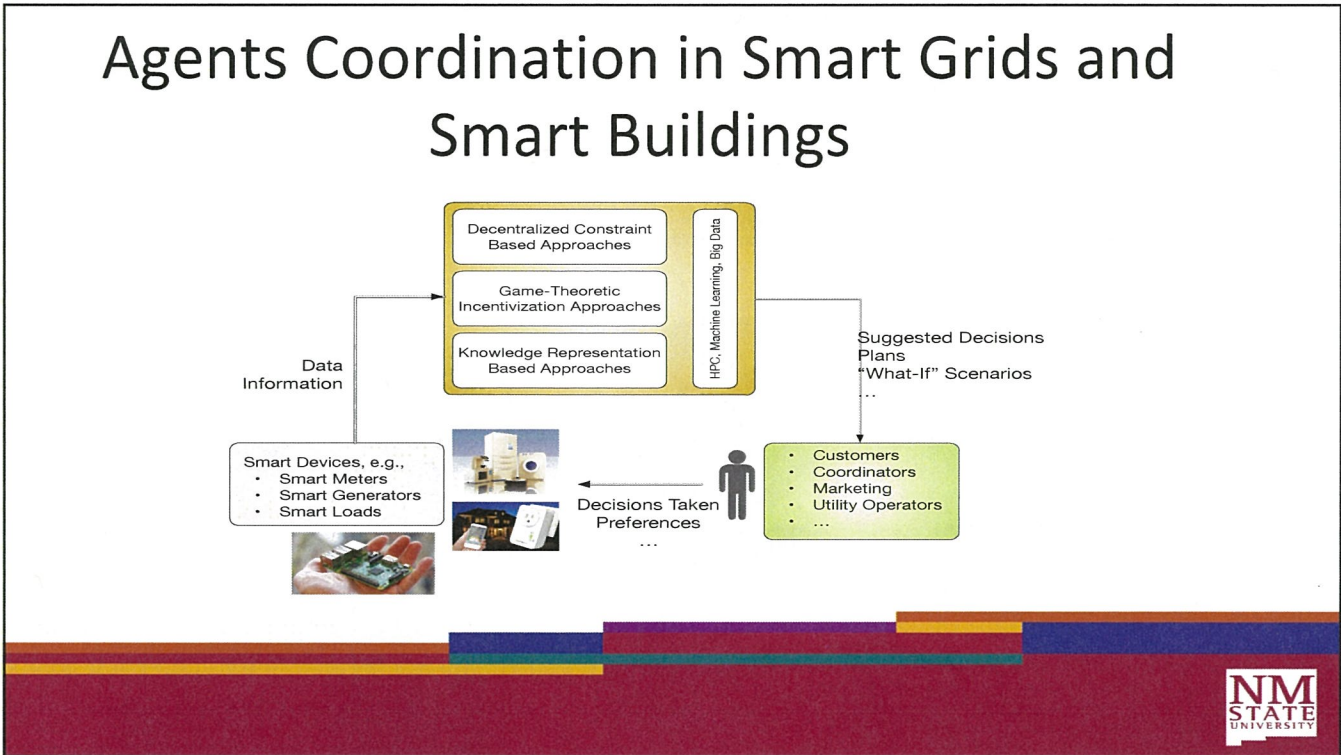
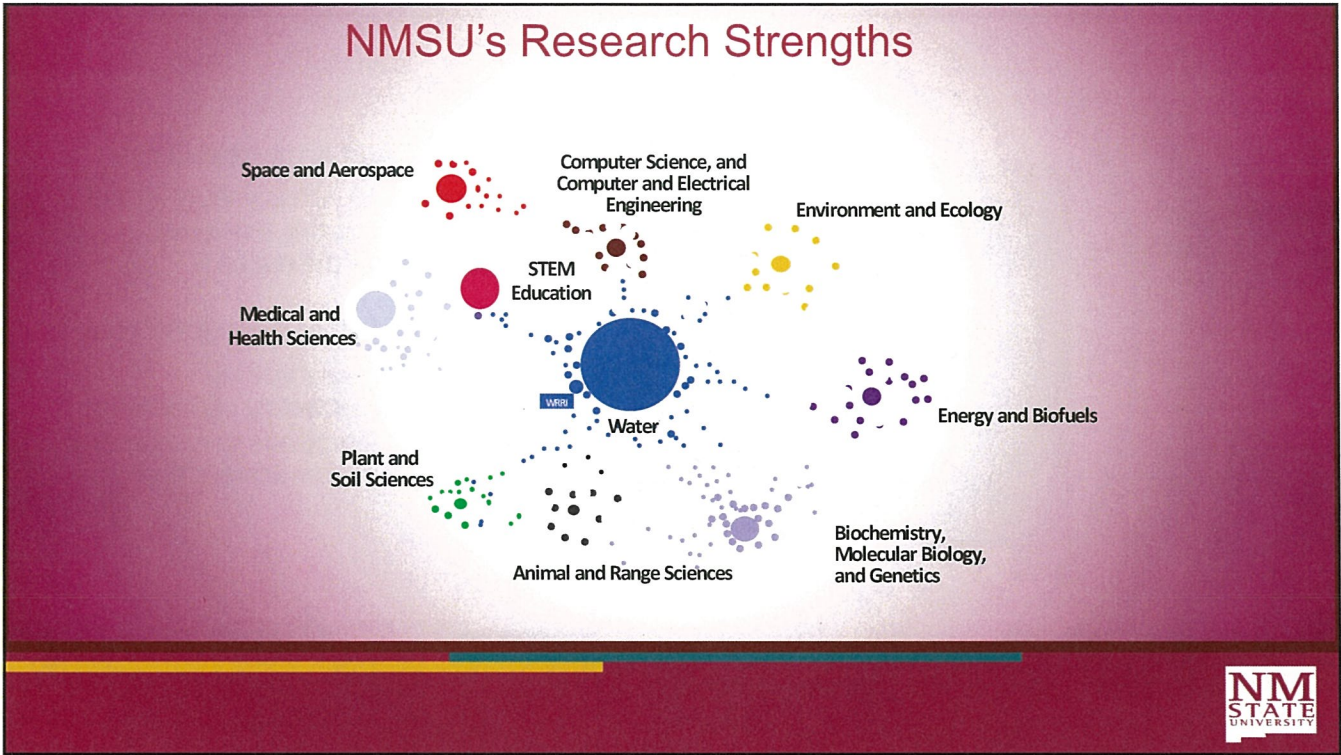
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Energy and Biofuels

- **Algal biofuels:** Algae cultivation, energy-positive nutrient recycling and waste water treatment, biomass chemical analysis, biomass to fuel processing, co-products from algae biomass, and techno-economic modeling
- **Microgrids:** Public policy issues, development of microgrid designs, development of advanced control systems, and prototype implementation
- **Solar Energy:** Product testing and evaluation for public and private agencies, policy development, instrumentation and data collection, training and outreach to PV professionals (installers, inspectors, designers, and policy makers), and the development of codes and standards
- **Wind Energy:** Wind energy development, including resource assessment, feasibility studies, project implementation, training, and systems monitoring
- **Fuel Cells:** new process configuration to produce biohydrogen from soil organic wastes; effective method for hydrogen storage

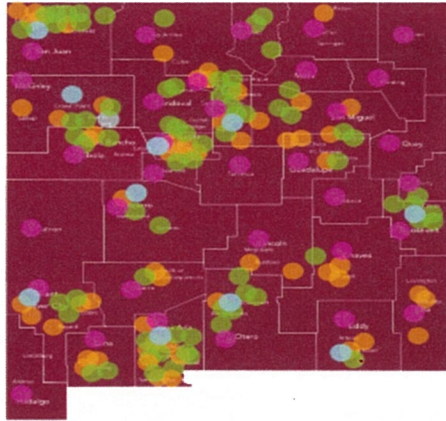


Arrowhead Center

Statewide Reach

LEGEND

- K-12 Entrepreneurship
- University Student Entrepreneurship
- Business Acceleration
- Economic Studies

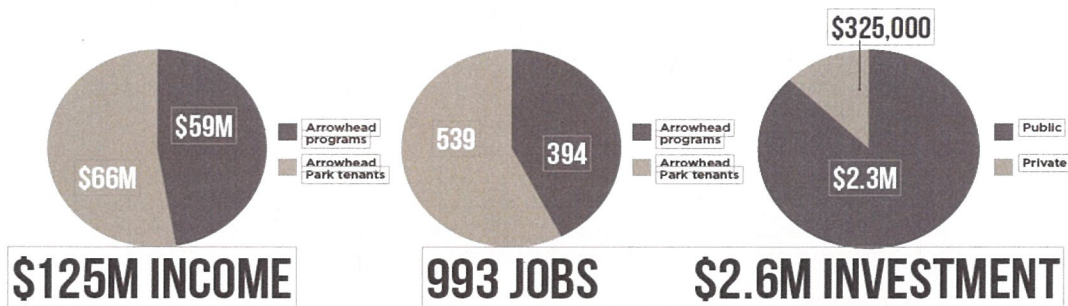


- The purpose of Arrowhead Center is to promote entrepreneurship and innovation, creating economic opportunity in the region.
- Arrowhead Center is a regional hub for entrepreneurship and innovation, connecting people who have exciting products to resources that will help them achieve their goals.



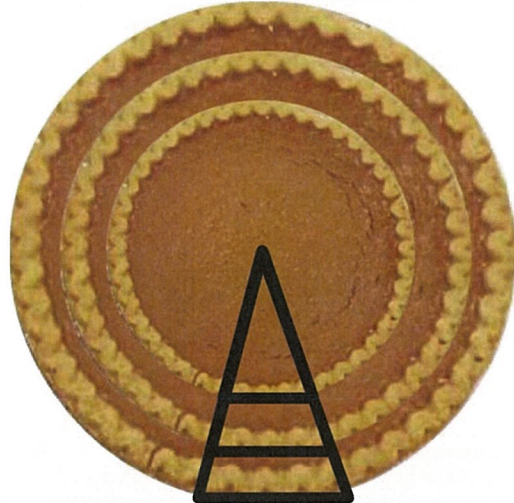
Arrowhead Economic Impact

Arrowhead Center provides resources that help create jobs and grow businesses. The versatile space at Arrowhead Park and the accelerator programs of Arrowhead Center contribute to the total economic impact and labor force of the entire region. Using IMPLAN, an economic impact model, we have estimated total labor income and jobs (direct, indirect and induced). In addition, Arrowhead client companies secured \$2.6M in public and private investment.



COLLABORATION GROWS THE PIE

- Be inclusive
- Diversify the funding base
- Form strategic partnerships



New Mexico IDEa Networks of Biomedical Research Excellence (INBRE) champions biomedical and community-based research excellence in the state of New Mexico through the development of innovative, supportive and sustainable research environments for faculty and students, community engaging health initiatives, while building a network of lead scientists and educators at the state, regional and national level.



NM-INBRE Economic Analysis 2009-2019

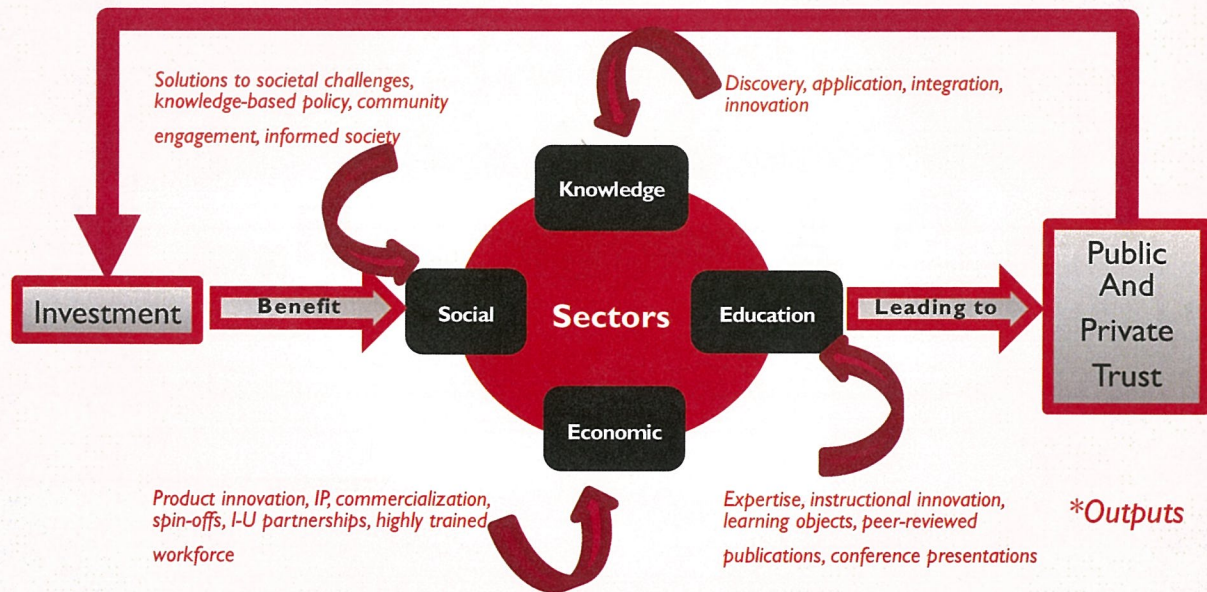
•The economic impacts of INBRE activities were estimated using IMPLAN PRO, economic modeling software. The IMPLAN model was originally developed for the U.S. Forest Service but for many years it has been maintained and sold by the Minnesota Implan Group, Inc. (<http://www.implan.com/>).

Table 11				
Economic Impact of NM-INBRE: 2009 to 2018				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	413	\$9,001,797	\$9,402,640	\$15,948,573
Indirect Effect	35	\$1,275,701	\$2,488,705	\$4,609,481
Induced Effect	150	\$5,380,680	\$10,403,292	\$18,628,161
Total Effect	598	\$15,658,178	\$22,294,638	\$39,186,215

* Analysis provided by James Peach, PhD, Regents Professor NMSU Department of Economics, Applied Statistics, and International Business
 ** The Institutional Development Award (IDeA) is a funding mechanism supported by the Institute of General Medical Sciences of the National Institutes of Health. The NM-INBRE Program has been funded by Grant #P20GM1103451 to Shelley Lusetti, PhD, NMSU Department of Chemistry & Biochemistry.



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Thank You



