

# University Research & Development: Impact of New Mexico's Technology Enhancement Fund

Presentation to the  
Legislative Finance Committee

Las Cruces, New Mexico

June 28, 2023



New Mexico State University



# Presentation Overview

- **NMSU Chancellor Welcoming Remarks**
- **Description of Research Areas and Priorities**
  - Tom Turner, Interim Associate Vice President for Research, UNM
- **Highlights of Current Research Projects**
  - Mike Doyle, Vice President for Research, NMT
  - Alisha Giron, Associate Vice President, Research Administration, NMSU
  - Tom Turner, Interim Associate Vice President for Research, UNM
  - Hengameh Raissy, Interim Vice President for Research, UNM-HSC
- **Technology Enhancement Fund Awards and Eligibility**
- **Technology Commercialization and Transfer**

# Description of Research Areas and Priorities



# Developing Research in an Academic Ecosystem

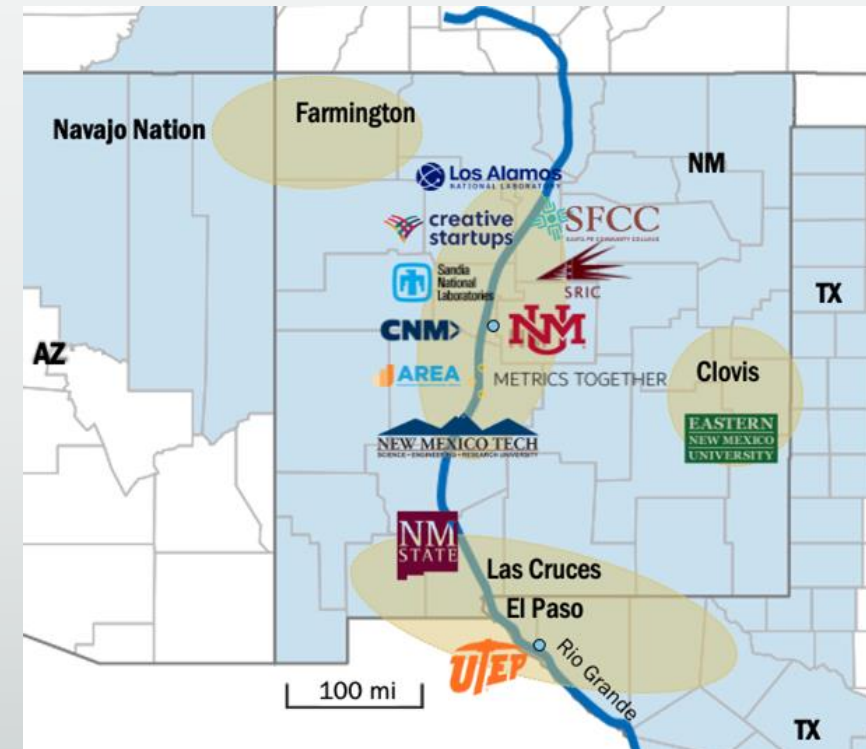
- **Pursuing Research Areas: Creation of new knowledge**
  - Research excellence requires breadth, depth, and productivity
    - Broad pursuit of topics for discovery
    - In-depth analysis for thought leadership
    - Funding enables research and increases productivity
- **Setting Priorities: Balancing excellence with needs**
  - National
  - Regional
  - Institutional
  - Unit

# Key Multi-institution Coordination Activities

1. **NM-INBRE** - IDeA Networks of Biomedical Research Excellence
2. **NM-EPSCoR** - Established Program to Stimulate Competitive Research
3. **NSF Regional Innovation Engines** –
  - Semi-finalists Type 2 implementation (\$160 M/10 year):
    - **RALI-WEST** (UNM & partners spent ~\$200K preparing)
    - CRISIS (ASU and partners spent ~\$2M preparation)
    - Space Valley
  - Awarded Type 1 planning (\$1M/2 year):
    - PETRA (UT-Austin led)
    - Advanced manufacturing (NTU led)
4. **NMC** – Consortium includes all three research institutions and LANL.
5. **APLU** – Multi-institutional Members on Council on Research (CoR)
  - allows a strong voice for HSIs in the southwest.
6. **Joint graduate programs** – Geography and Public Health
7. **Shared Instrumentation** – Needed to train our students for good jobs here in NM

## RALI-WEST

- Clean water to every tap
- Decarbonized energy to every door
- 15 partner and 27 collaborating organizations





# Highlights of Current Research Projects

# New Mexico Tech

## Priorities

- Reach Carnegie R1 Status by 2027
  - Displacing Caltech as the Nation's Smallest R1 University
- Achieve Positions of National Leadership
  - Spatial Science - from sub-cellular to cosmic scales
  - Post-quantum Cyber Preparedness
  - Cyber/Data Assurance in the Age of AI
- Expand Translational Research and Tech Commercialization

## Key Focus Areas

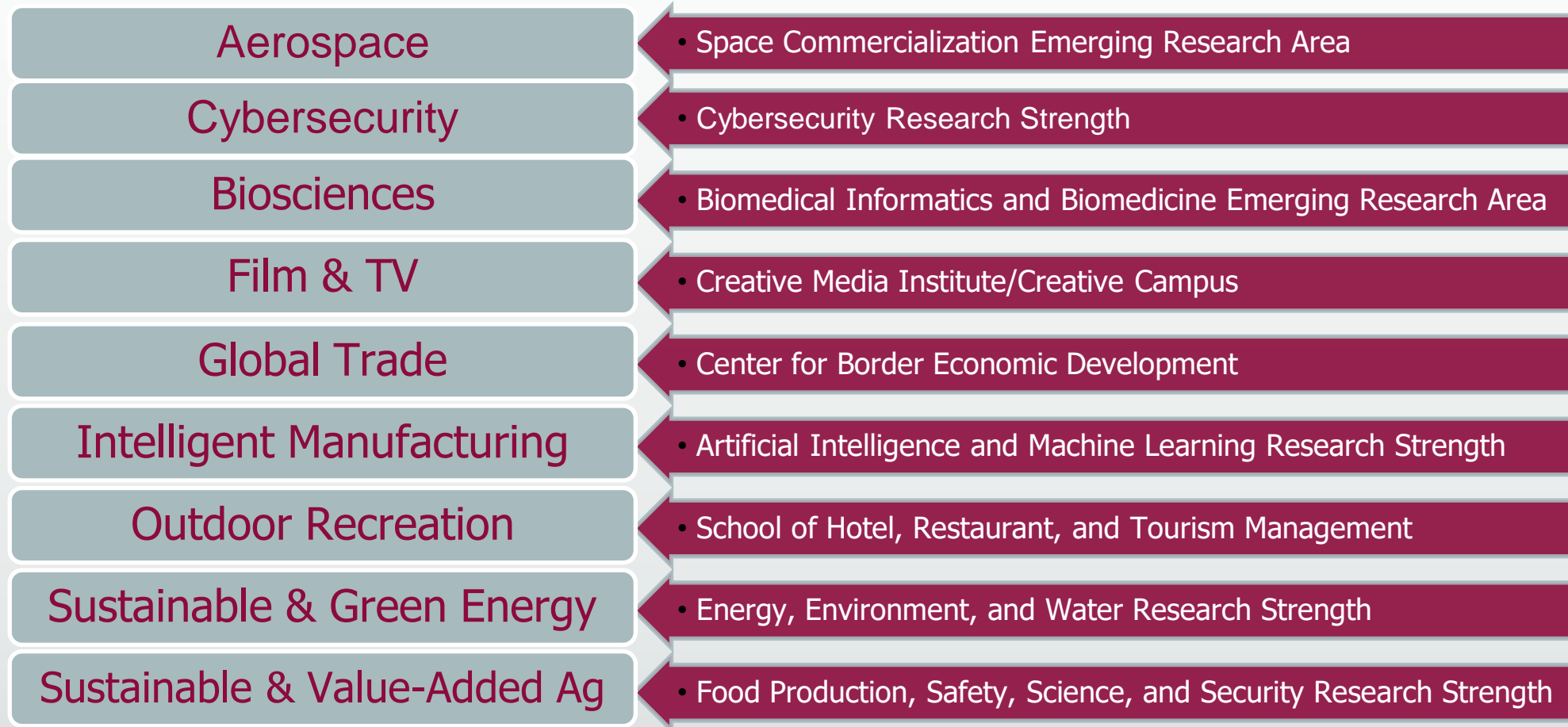
- Geologic Mapping
- Water Resources Science, Technology, and Education
- Energy Management and Security
- New Manufacturing Technologies

## Highlights

- Revolutionary Desalination Technologies
- Game-Changing Tech for Electronic Infrastructure Resilience
- Breakthroughs in Additive Manufacturing



# Focus Areas, Priorities and Highlights



**STEM+ Education Research Institute**



# UNM RESEARCH: BY THE NUMBERS

FY21

FY22

**\$111M**

EXPENDITURES

**\$129M**

**881**

AWARDS RECEIVED

**808**

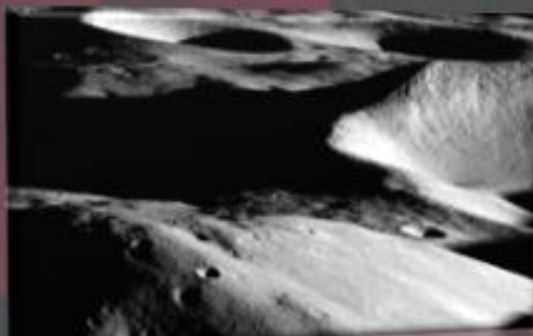
**1,107**

STUDENT RESEARCHERS SUPPORTED

**1,226**

## RECENT HIGHLIGHTS

UNM's CASA Moon team selected by NASA's SSERVI for new lunar research: \$7.5 M



Credit: NASA/GSFC/Arizona State University

UNM's Center for Pedestrian and Bicyclist Safety selected for new USDOT Tier 1 UTC: \$15M



**ARID**



QUANTUM NEW MEXICO >

*New Mexico is a Quantum State*

# GrandChallenges

**\$52.5M**

NEW FUNDS GENERATATED

**\$2.1M**

INITIAL INVESTMENT

**10**

LEVEL 1 CONCEPT TEAMS CREATED

Substance Use Disorder: Critical Health Impacts

Sustainable Water Resources: Launched ARID

Successful Aging: New \$2.5M Award

## KEY FOCUS AREAS

Cultivate collaborative and transdisciplinary research that addresses grand challenges that represent the state’s needs and strengths with the intent of impacting the health and economy of New Mexico.

## PRIORITIES

Coalesce established critical research areas of strength around substance abuse, health equity, and environmental health

	FY19	FY20	FY21	FY22	FY23 (Partial 6/21)
<b>Total Awards</b>	\$190,413,939	\$205,791,163	\$212,476,783	\$238,758,231	\$215,444,589

## Highlights

- PROJECT ECHO
- CLINICAL AND TRANSLATIONAL SCIENCE CENTER (CTSC)
- COMPREHENSIVE CANCER CENTER
- FETAL ALCOHOL DEFICIT CENTER
- CENTER FOR NATIVE ENVIRONMENTAL HEALTH EQUITY RESEARCH
- PREVENTION RESEARCH CENTER

**900+ ACTIVE AWARDS & RESEARCH PROJECTS** in 6 Signature Research Focus Areas:

Environmental Health Sciences  
Brain & Behavioral Illness  
Cardiovascular & Metabolic Disease

Infectious Disease & Immunity  
Child Health research  
Cancer

## VIVA PROJECTS

A longitudinal study of physical activity in the rural Southwest



### VIVA: STEP INTO CUBA 2009-2014

- Adapted & implemented **5** community-based strategies known to increase physical activity
- Developed a Beta Site/Model in Cuba, NM for dissemination, adaptation, implementation, demonstration, training & networking



### VIVA II: VIVA CONNECTS 2014-2019

- Adapted Model and scaled up to **31** rural communities
- Going forward starting in 2019, continue to study sustainability of VIVA II Action Communities using virtual TA

#### ACTION COMMUNITIES

- |                   |             |
|-------------------|-------------|
| • Silver City     | • Abiquiu   |
| • Deming          | • Taos      |
| • Tularosa        | • Raton     |
| • Torrance County | • Tucumcari |
| • Grants          | • Española  |
| • Edgewood        | • Cuba      |

### VIVA III: HEALTHY PLACES, HEALTHY PEOPLE 2019-2023

#### EASTERN AGENCY CHAPTERS

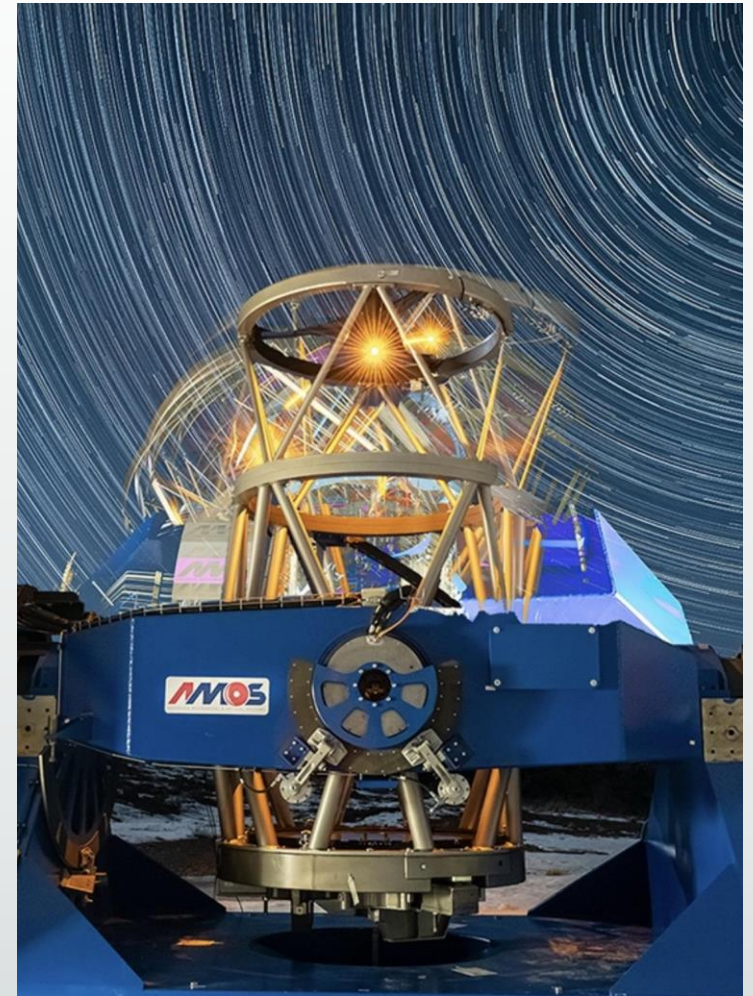
- |                |                         |
|----------------|-------------------------|
| • Baca/Prewitt | • Becenti               |
| • Counselor    | • Crownpoint            |
| • Huerfano     | • Torreon/<br>Star Lake |
| • Nageezi      | • To'Hajiilee           |
| • Ojo Encino   |                         |
- Adaptation and scale up of the Model to the Navajo Nation **9** Chapters in Eastern Agency Checkerboard Area.
  - Gathering Place(s) to disseminate, demonstrate, adapt and network; this will include the Diné College public health students.

# Technology Enhancement Fund Awards and Eligibility



# TEF: Enabling Research Competitiveness

- Total amount of projects funded so far: \$14,265,133
- Dollars leveraged — ROI to the state: \$127,553,178
- How has this driven collaborative efforts?
  - More than half the funded projects include multiple NM institutions collaborating with each other
- New kinds of funding are enabled
  - Industry, foundations, new areas within existing agencies
- Examples of increased competitiveness relative to regional competitors?
  - What other states have anything like this? Few, if any!
- More funded research projects mean more graduate degrees, and more undergraduate research experiences!
- IP impact will inevitably be significant



# Technological Enhancement Fund Impact: First Round: New Mexico Tech

## Examples of projects enabled by matching funds

- Water purification, water data, and water data access
- Geological mapping, critical minerals research
- Carbon sequestration in the San Juan Basin
- Raman Microscopy for advanced minerals/materials analysis
- Additive manufacturing for space exploration

**New Mexico Tech would have left considerable federal money on the table without the availability of TEF matching funds**



# NMSU FY23 TEF-AWARDED PROJECTS

**\$1.3 M**

## Molecular Structure Determination Core Lab



**\$3.9 M**

## Advanced Chemical Analysis Instrumentation Facility



**College of ACES/AES**



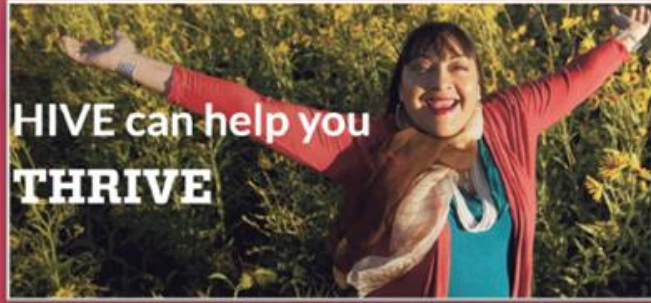
**\$10 M**

## Wild Animal and Lab Animal Vivarium Instrumentation

UNM-Taos: HIVE Pollinator  
An incubator/accelerator  
program for tech-based  
businesses: \$747K



NSF TODOS - Inspiring and  
networking K-12 STEM  
educators in NM \$918K



World-class 3D Micro-CT  
x-ray scanning  
instrumentation: \$464K

# FY 23 TEF HIGHLIGHTS

**\$4.4M**  
Total TEF  
requests

**\$26.8M**  
Total non-state  
funding requests



Refine and adapt forest  
thinning and fuels reduction  
treatments with USDA Forest  
Service: \$1.0M



# 6x ROI

Before impact multipliers  
and if all are awarded



Next phase DOE funding for  
dime-size sensors for natural  
gas leak detection \$500K

## UNM FIRST

**\$15.6M**  
FIVE-YEAR AWARD

MENTORING PLAN AND  
COMPETITIVE START-UPS  
FOR NEW HIRES

GOAL IS TO ENHANCE  
INCLUSIVE EXCELLENCE  
AT UNM

**9**

NEW DIVERSE FACULTY HIRES

ONGOING SEARCHES IN  
SIX STEM DEPARTMENTS







HEALTH  
SCIENCES

CLINICAL & TRANSLATIONAL  
SCIENCE CENTER

# Technological Enhancement Fund (TEF) Impact: First Round: UNM Health Sciences Center

- To alleviate toxicity from environmental metal exposure in uranium mining communities through nutritional supplementation with zinc.
- To increase training and distance coaching of highly specialized teaching strategies for children with deaf-blindness
- To build a career pathway for students in 2- and 4- years programs with a focus on translational research
- To access to and use of broadband and devices for healthcare and education by families with school-aged children
- To identify effective approaches to reduce disparity in care of kidney transplant patients and assessing how social determinants of health are associated with those disparities in care

## EXAMPLES OF RESEARCH SUPPORTED BY TEF:

**\$3.2M** Total TEF Request

**\$19.5M** Total non-State Funding

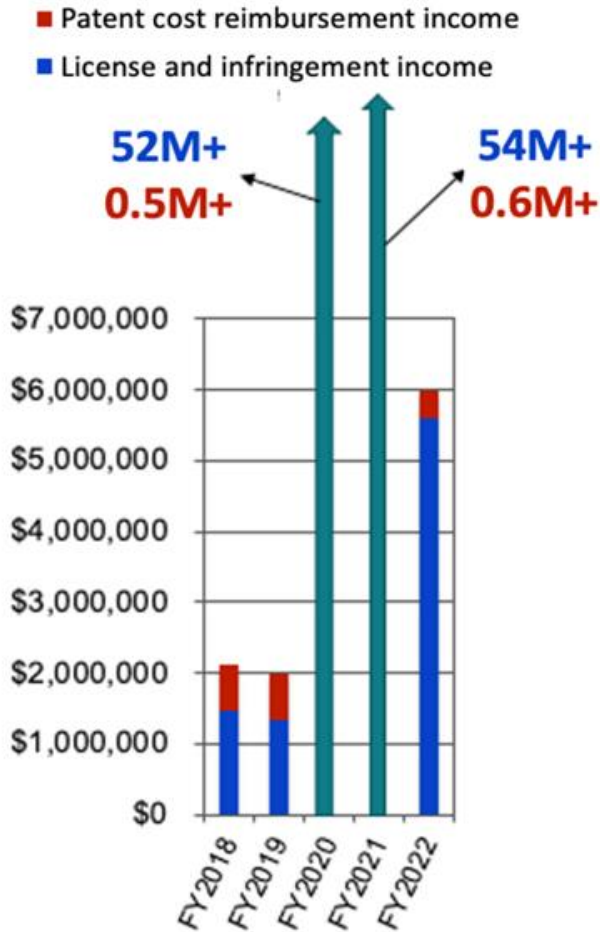
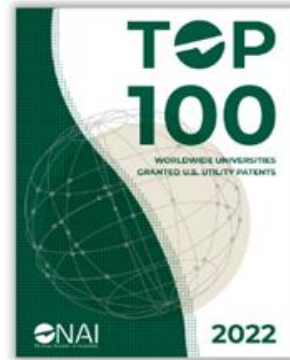


# Technology Commercialization and Transfer

# UNM RAINFOREST INNOVATIONS

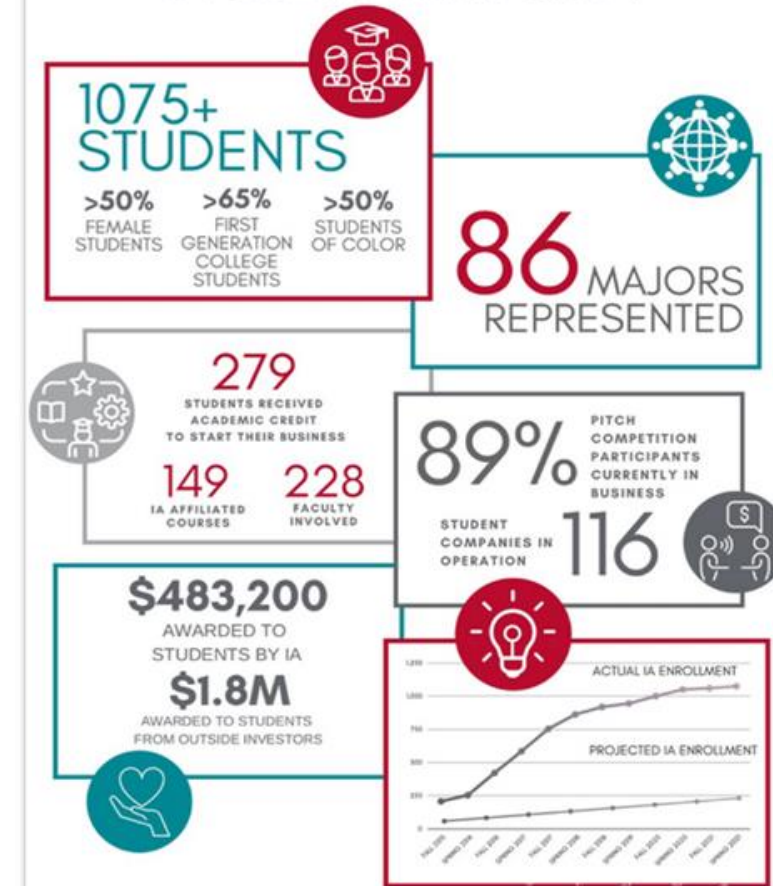
Supporting Technology Transfer and Catalyzing Economic Development

- ❖ Major Programs
  - Rainforest Accelerator
  - Innovate New Mexico
  - EDA University Center
  - Tribal Entrepreneurship Program
- ❖ In top 100 worldwide universities with largest number of issued US patents for the seventh year in a row
- ❖ 56% of the 162 companies spun out from the University of New Mexico are still in business and active; 48 of these startups are active in New Mexico



## UNM INNOVATION ACADEMY

### STUDENT SNAPSHOT



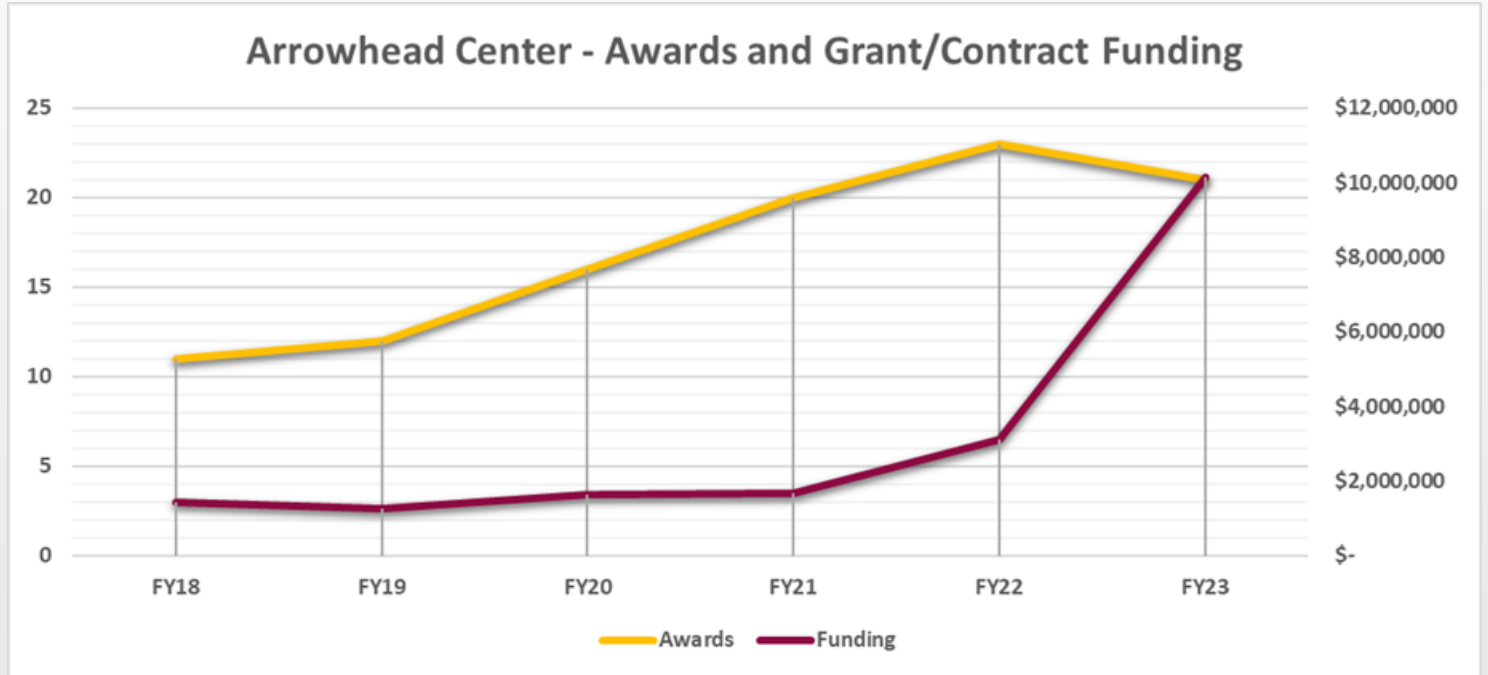
# Emerging Collaborations in Research Driven Economic Development



ARROWHEAD CENTER®



Arrowhead Center - Awards and Grant/Contract Funding



- Infrastructure for Media, Healthcare, and Aerospace Clusters
- NSF I-Corps Southwest Region Hub
- EDA Economic Adjustment Assistance (Building Resilience and Entrepreneurship in a Coal Community [BRECC])
- EDA Venture Challenge (Scale Up New Mexico)

# NMT Office of Innovation Commercialization

## Current Initiatives

- NSF Advancing Research Translation
- NSF ENGINES projects
- EDA TechHubs

## Intellectual Property and Commercialization Highlights

- Desalination of produced and brackish water
- Tin Whiskering Solution for electronic infrastructure resilience
- SuperAlloy for additive manufacturing

## Impact

- New sources of potable water
- Dramatically extend the useful life of electronic components
- Enable 3D printing of machine components for high-temperature environments
  - Such as turbine blades



# Concluding Remarks

- **Thank you** to our policy makers for the **\$75 million investment** during the past couple of legislative sessions for matching funds through the Technology Enhancement Fund
- The additional investment will provide New Mexico's research institutions with the opportunity to **compete with other states** for research funding and expand inter-institutional collaboration throughout the state
- Our ultimate goal is investment in funding to enhance **research and economic development** in the State of New Mexico
- To provide a sustainable resource to **promote New Mexico's research enterprise**, we respectfully propose a series of additional investments of \$20M/year for 5 years in the Technology Enhancement Fund

# Benefits of Geologic Mapping to New Mexico

- Geological mapping is used for mineral/energy resource evaluations, water assessments, hydrologic modeling and hazards assessments, city planning, real estate evaluation
- Mapping is estimated to return \$100 to a state's economy for every \$1 invested in map production
- The United States Geological Survey provides funding to states for geological mapping, through competitive proposals.
  - A 1:1 match of state to federal dollars is required.
- The TEF fund allowed the New Mexico Bureau of Geology and Mineral Resources to accept a grant of \$766,072 for FY23, and we have a pending TEF fund request that, if successful, will allow us to receive an additional \$640,250 in FY24.
- The TEF fund allows us to not leave federal dollars on the table, but to bring these funds, and associated economic benefit, to our state

