RESEARCH

UNM Research Update

Science, Technology, and Telecommunications Committee

September 30, 2024

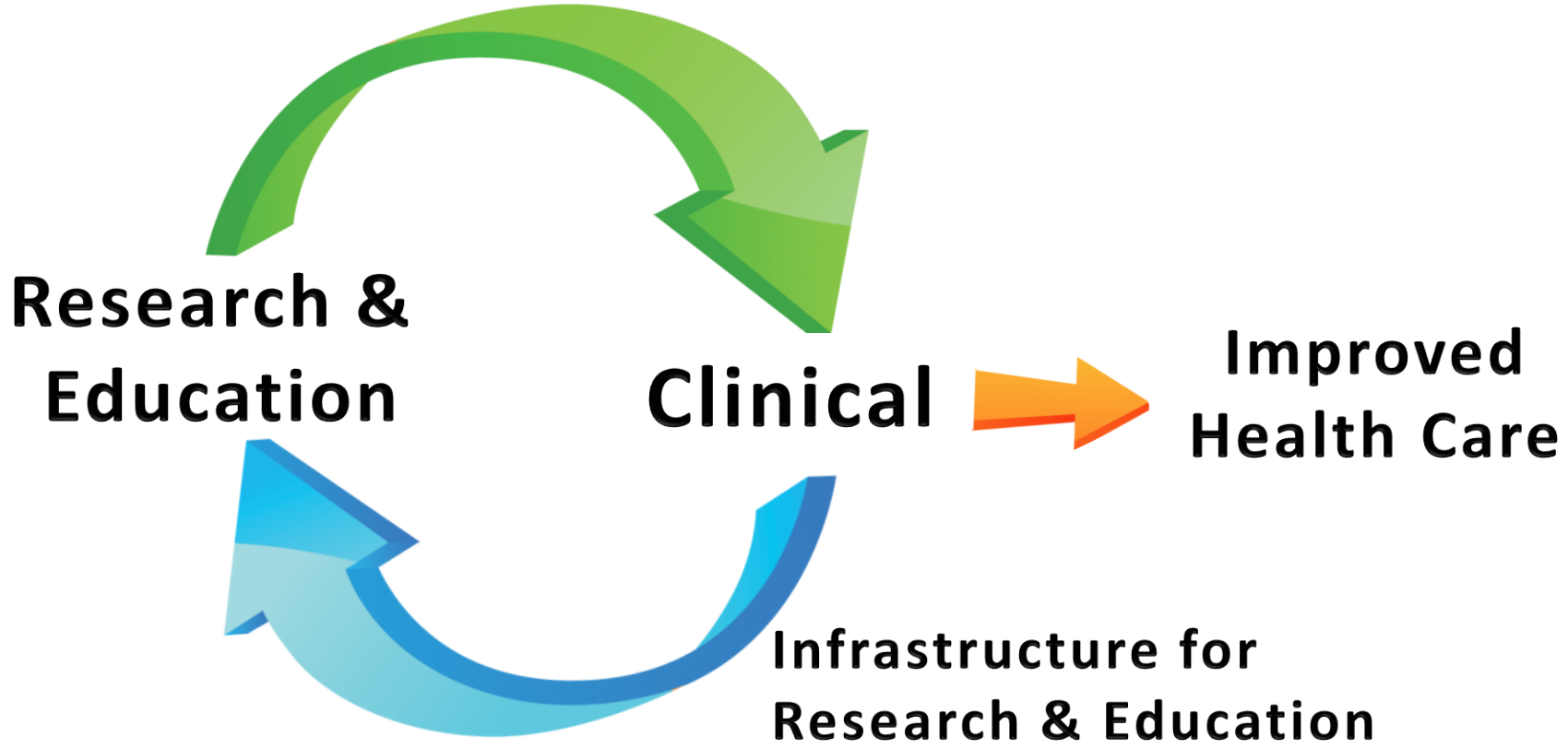
David Hanson, PhD
Assistant Vice President for Research
Professor of Biology, UNM

Hengameh Raissy, PharmD
Professor of Pediatrics
Interim Vice President for Research
Health Sciences Center, UNM


RESEARCH
means HOPE
RESEARCH *IS* ADVANCING NEW MEXICO
Research Saves Lives
RESEARCH *IS* ECONOMIC DEVELOPMENT
RESEARCH *IS* INNOVATION
RESEARCH *IS* SUSTAINABILITY
RESEARCH *IS* EDUCATION
RESEARCH *IS* JOB CREATION
RESEARCH *IS* THE FUTURE
RESEARCH *IS* CREATIVITY
RESEARCH *IS* INCLUSIVE EXCELLENCE
RESEARCH *IS* SCHOLARSHIP

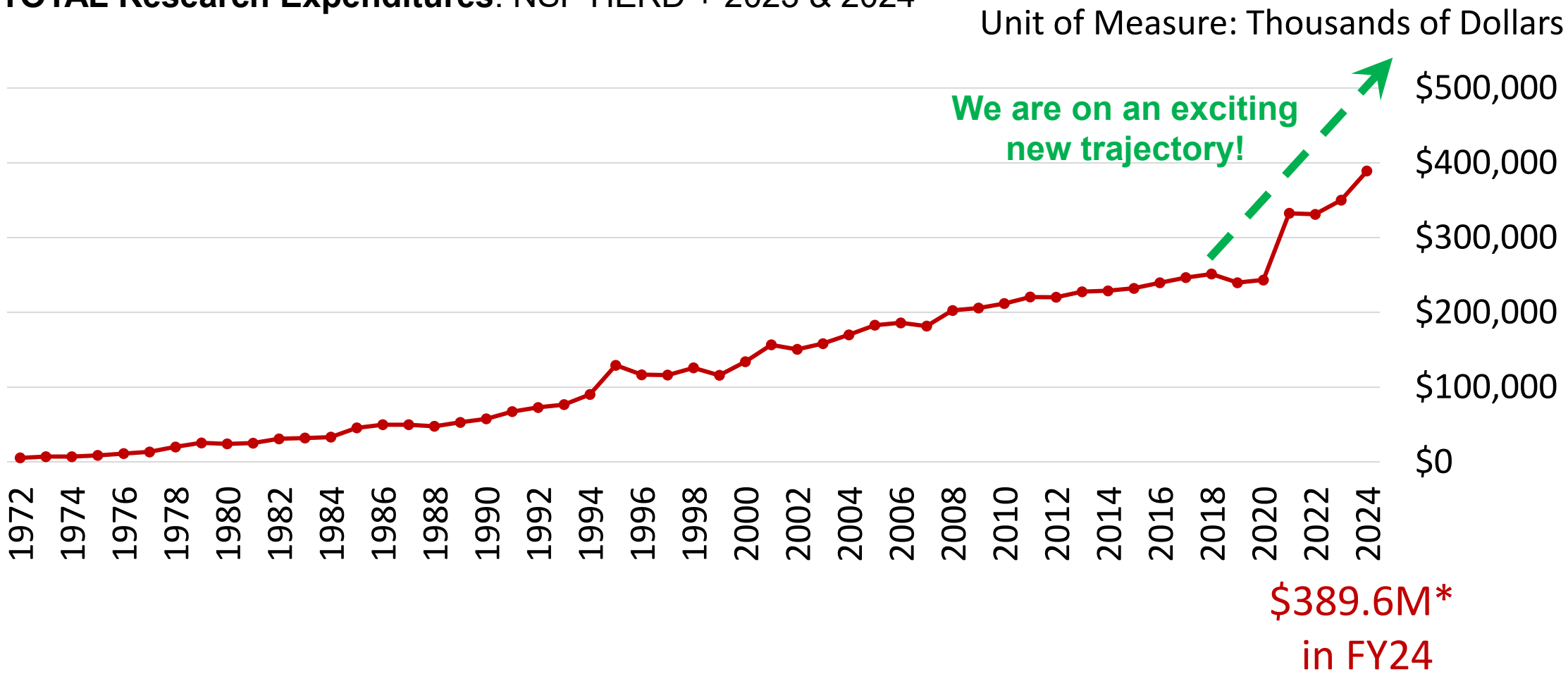
Investing in Research Produces Success for New Mexico

- Latest advances in delivery of health care & disease prevention
- Enhanced national reputation & competitive positioning among peer states
- Workforce Development



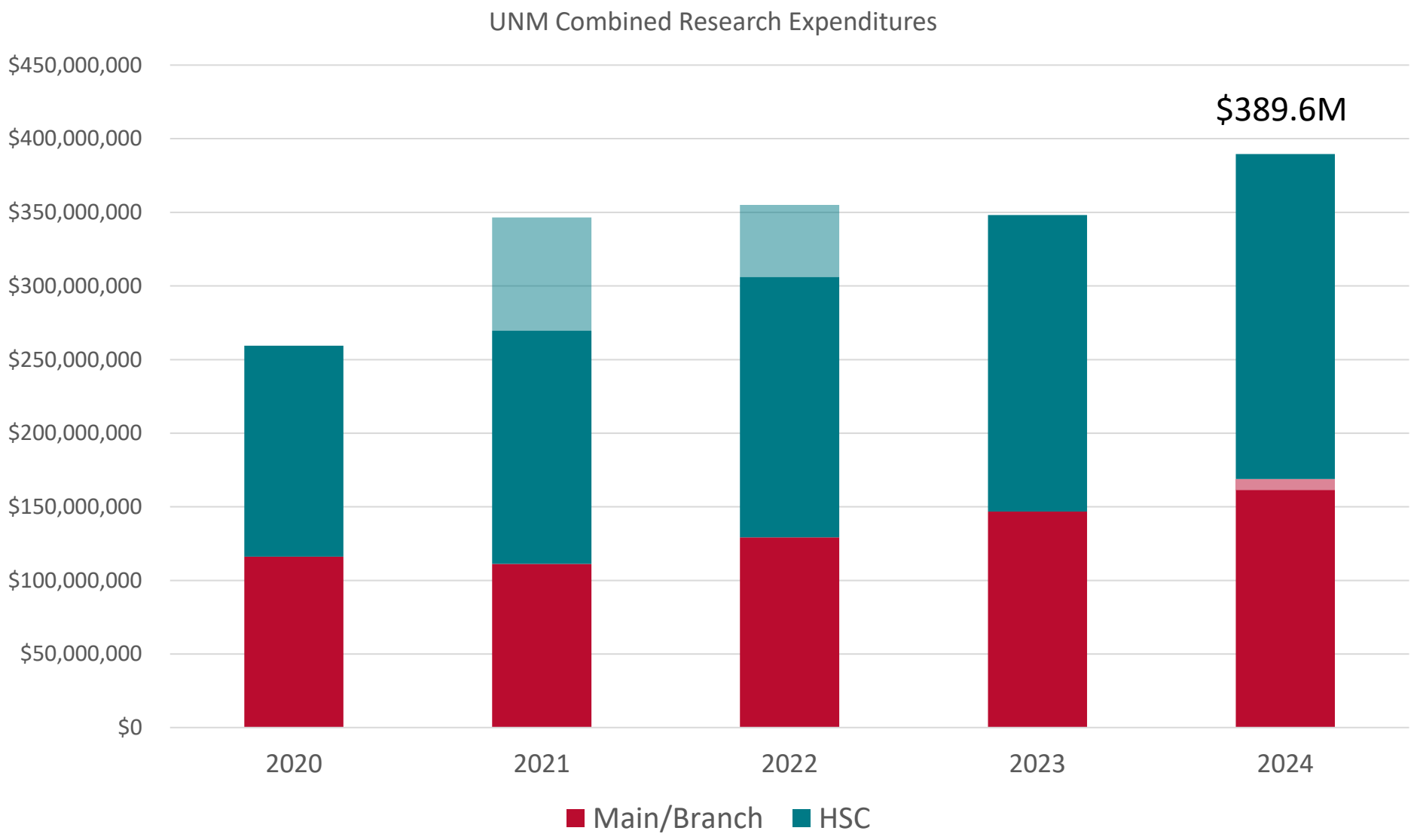
Trendlines: UNM Research is Accelerating

TOTAL Research Expenditures: NSF HERD + 2023 & 2024



Source: national center for science and engineering statistics, higher education research and development (HERD) survey

UNM Total Research Expenditures



How is university research actually funded?

University research is *not* funded via state-appropriated Instruction & General (I&G) funding, but is instead a combination of:

- Federal grants, especially NIH and NSF
- Other state and local grants and awards
- Industry partnerships: we are below the national average but this should increase with the expansion of more NM industry
- Foundations: we are close to average but we are exploring upward mobility in foundation-funded research

Note: Managing grants and providing facilities for their execution is EXPENSIVE

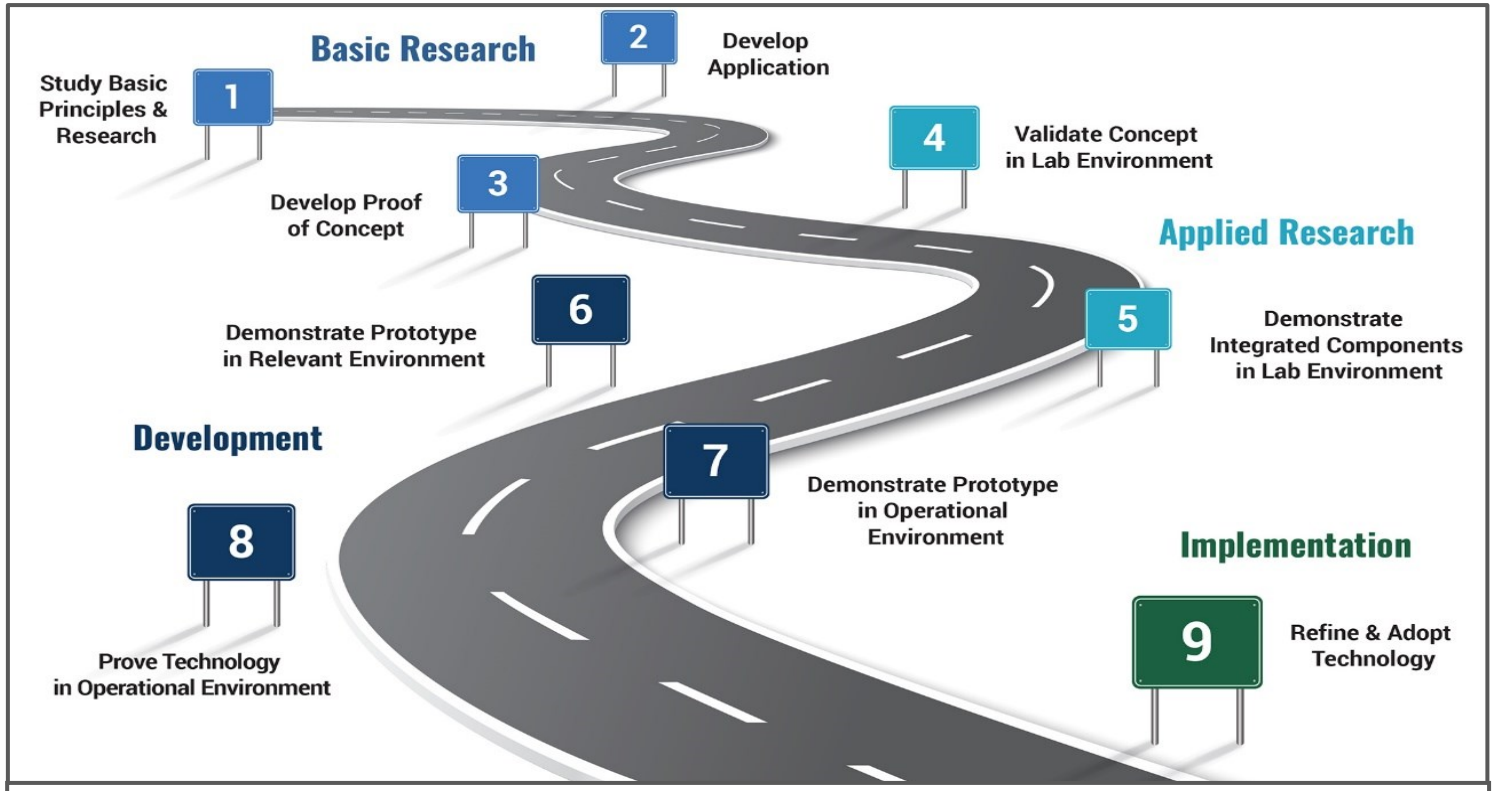
- Overhead (F&A) reimburses for some of these sunk costs, and often less than half of eligible costs are covered

Competition for research funding is intense

- Grant cycles are SLOW – usually 6-24 months from start of proposal writing to receipt of funds
- Grant preparation and planning is EXPENSIVE from the university resources perspective
- Collaboration and interdisciplinarity are increasingly important
- “Hard” required matching is a fixed percent needed to be able to apply
  - Historically limiting for Department of Energy grants and some other agency grants, but Technology Enhancement Fund (TEF) & NM DFA Match Fund are proving to be game-changing
- “Soft” required matching means you must demonstrate institution support or regional commitments, i.e., you can apply without it, but your chances of a successful grant application will be diminished
  - Soft match is an implied requirement for our major funders (NSF and NIH)
  - Also common for big regional grant opportunities (i.e., EDA Tech Hubs and NSF Engines)

University Research: Innovation

What is the ***Technology Readiness Level*** *(TRL) pathway, and why does it matter?*



Technology readiness levels define the path from innovation research to deployment

Source: U.S. Department of Transportation, Federal Highway Administration, as adapted from a NASA model used to describe the 9 steps an innovation undergoes from concept to deployable resource

https://www.fhwa.dot.gov/innovation/innovator/issue77/page_04.html

University Research: Going to market

- Who actually "does commercialization" in the state?
  - Universities create IP and train students (low TRL)
  - University technology transfer offices (e.g., UNM Rainforest) handle patenting and licensing which requires some firewalls with higher education institutions (low to medium TRL)
  - Start-ups & industry partners do the commercialization but the valley of death between government research funding and industry commercialization funding is wide (medium to high TRL)

- Challenges for developing marketable intellectual property (IP)
  - Protecting IP is expensive and requires a culture of innovation
  - Training entrepreneurs and connecting them to inventors is hard
  - Funding to advance research beyond the concept stage is challenging because of required matching to access grant funding (SBIR and STTR) and limited other alternatives

Selected research priorities leading to success

- **UNM (Main)**
  - New ARID Institute
  - New QNM-I Institute
  - Wildland Fire Science/Reforestation, DOT-Pedestrian &Bicycle Safety, SW Environmental Finance Center EPA funds, Center for High Technology Materials (CHTM), Center on Alcohol, Substance use, And Addictions (CASAA)

- **UNM HSC**
  - Research infrastructure: CTSC, Center for Brain Recovery and Research (one of the three COBRE grants)
  - Substance use disorder: New Mexico Clinical Trials Node: Clinical research and practice to address substance use in diverse, rural and underserved populations; HEAL Initiative: Neonatal Opioid Withdrawal Syndrome Pharmacological Treatments Comparative Effectiveness Trial New Mexico Site; Fetal Ethanol-induced behavior deficits: Mechanisms, diagnosis and Intervention
  - Memory and aging: New Mexico Alzheimer's Disease Research Center (P30), The Southwestern Stroke Alliance Regional Coordinating Center
  - Health disparities: Wide Engagement for Assessing COVID-19 Vaccine Equity ; UNM Pediatric Clinical Trials Center in IDeA States Pediatric Clinical Trials Network
  - Environmental Health: Understanding Risk Gradients from Environment on Native American Child Health Trajectories: Toxicants, Immunomodulation, Metabolic syndromes, & Metals Exposure, New Mexico Integrative Science Program Incorporating Research in Environmental Sciences (NM-INSPIRES)

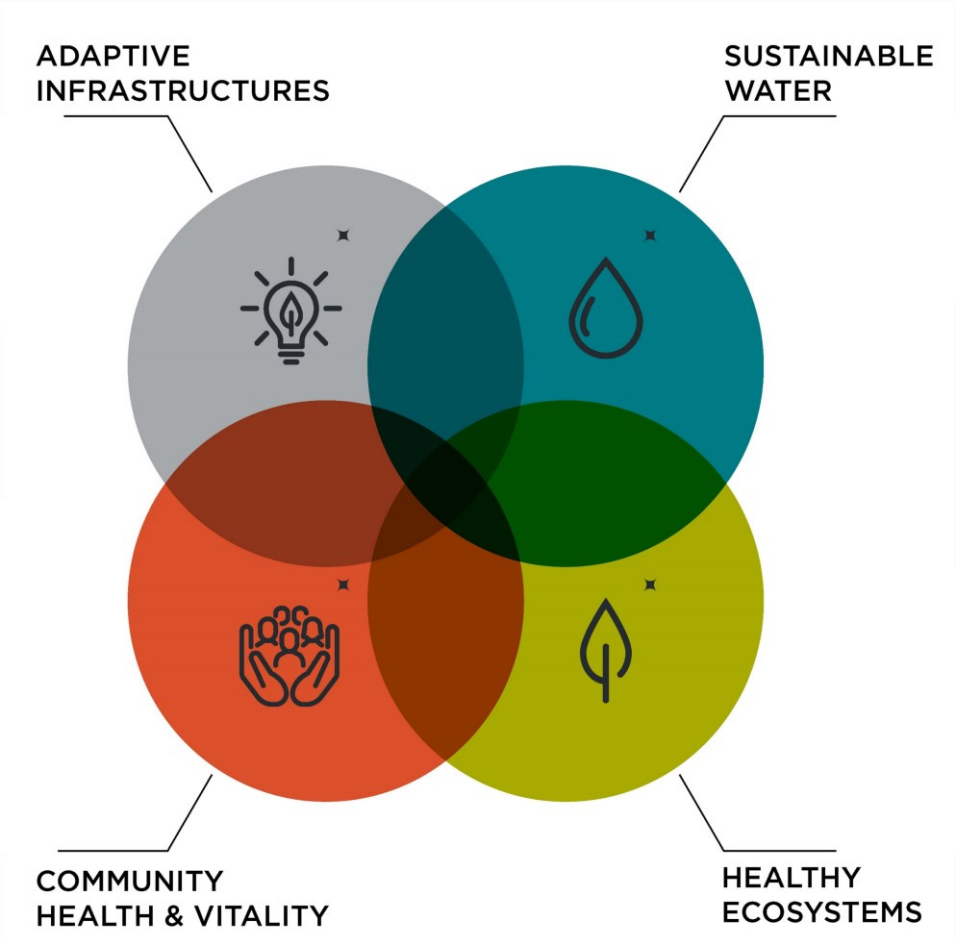
- **New University-wide *Grand Challenges* Teams: Impacting New Mexico**
  - Sustainable Space Research and Collaboration
  - "Just Transitions" to Green Energy
  - Child Health and Maltreatment Prevention/Intervention

And now we will go into more detail about some of these priority endeavors ...

ARID Institute (launched 2023)

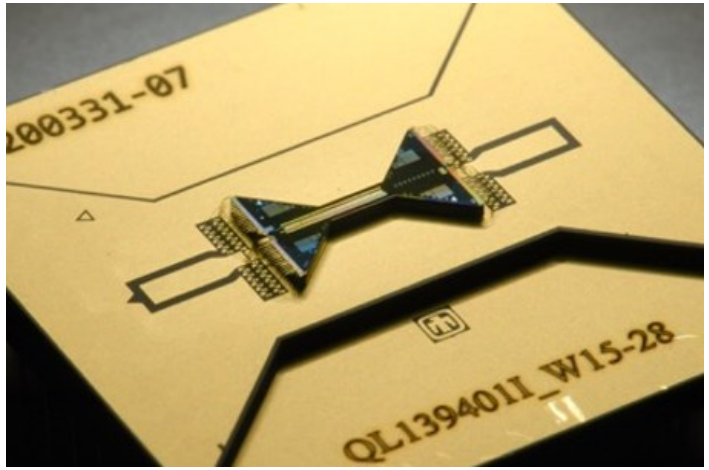
Mission: *ARID enhances the resilience of communities, ecosystems, and the economy to climate change through inclusive and equitable research, education and collaborative partnerships in New Mexico and drylands worldwide.*

- Renowned, diverse leadership team
  - 20+ researchers; 11+ disciplines
  - Launching national director search
- Sampling of ARID projects
  - Gila headwaters – enhance ecosystem resilience
  - Hydrologic modeling and biogeochemical network
  - Impact of wildfire and forest management practices
  - Public perceptions of potable water reuse
  - Sevilleta Long-Term Ecological Research Program
- >$18M in new funding
  - Combination of federal and state funding
- RPSP Request for ~$3M
  - Stabilize operations & build broader impact statewide with education & training programs

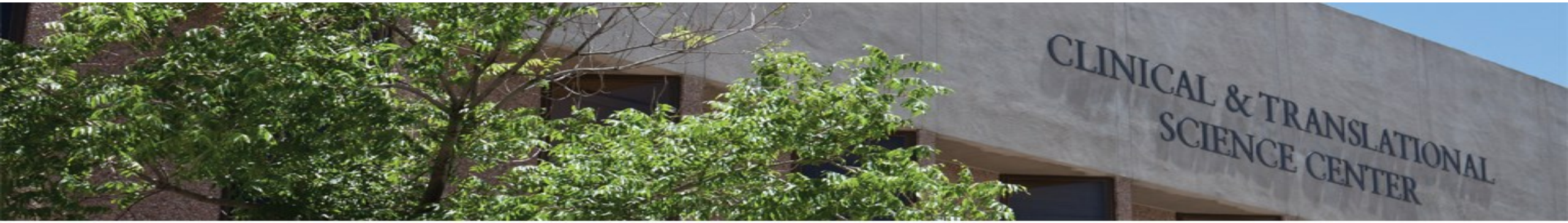


QNM-i (Launched 2024)

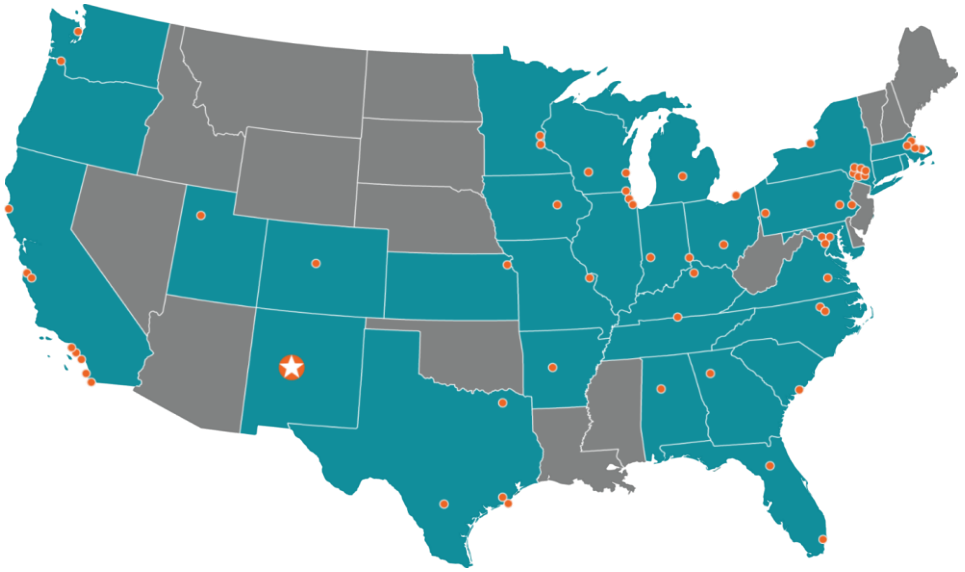
- Quantum New Mexico-Institute
  - The 4pm presentation will cover this new institute!
- Funding just this year: ~$12M
- Includes Workforce Development: theory & experiment for high school students, teachers, and undergraduates



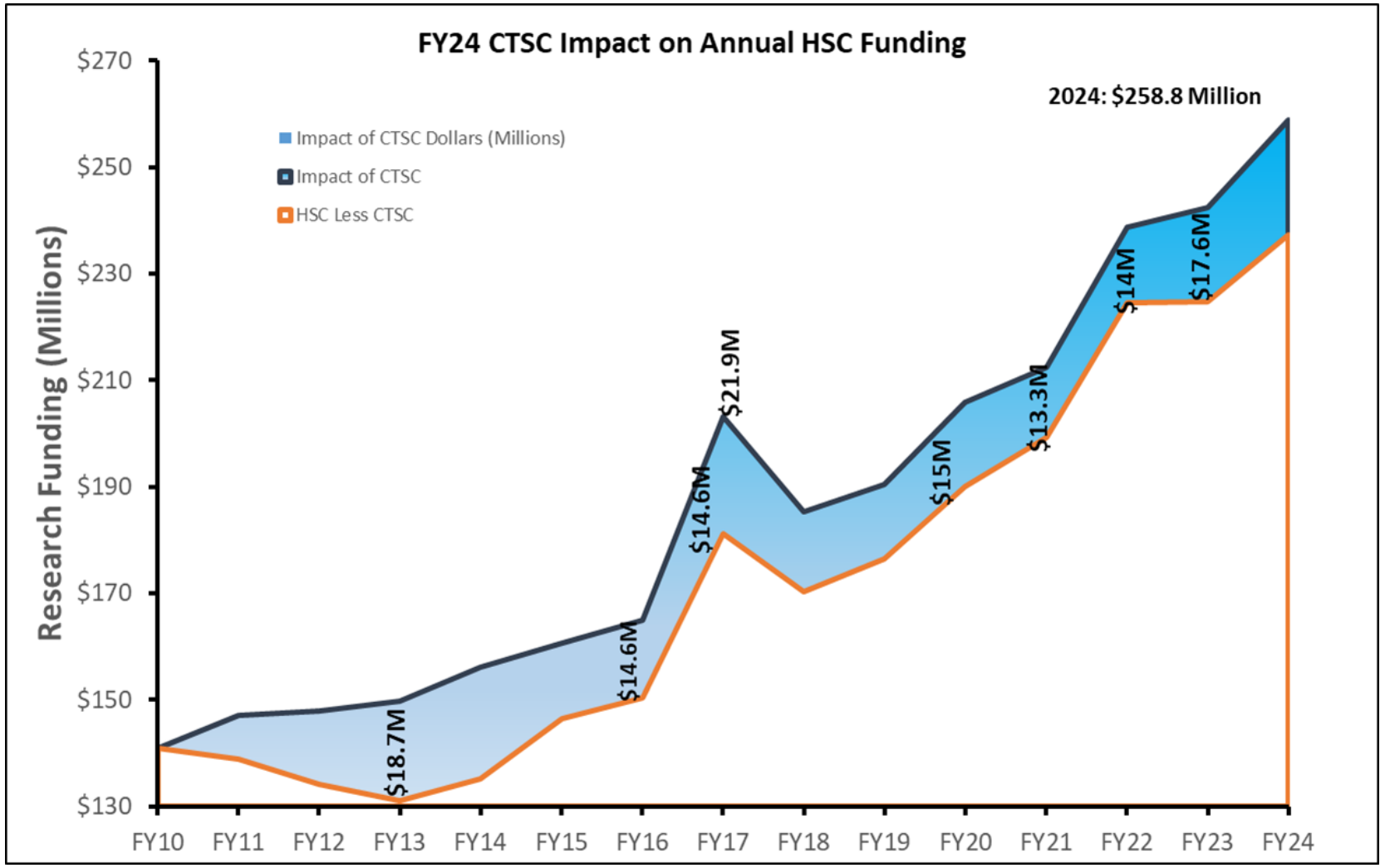
UNM Clinical & Translational Science Center



- Funded in 2010; renewal achieved in 2015 and 2020
- Builds a collaboration network
- $25 Million + $29 Million (networks)
- Key Programs:
  - Pilot funding
  - Education programs
  - Enhanced technology
  - Enhanced component-led research



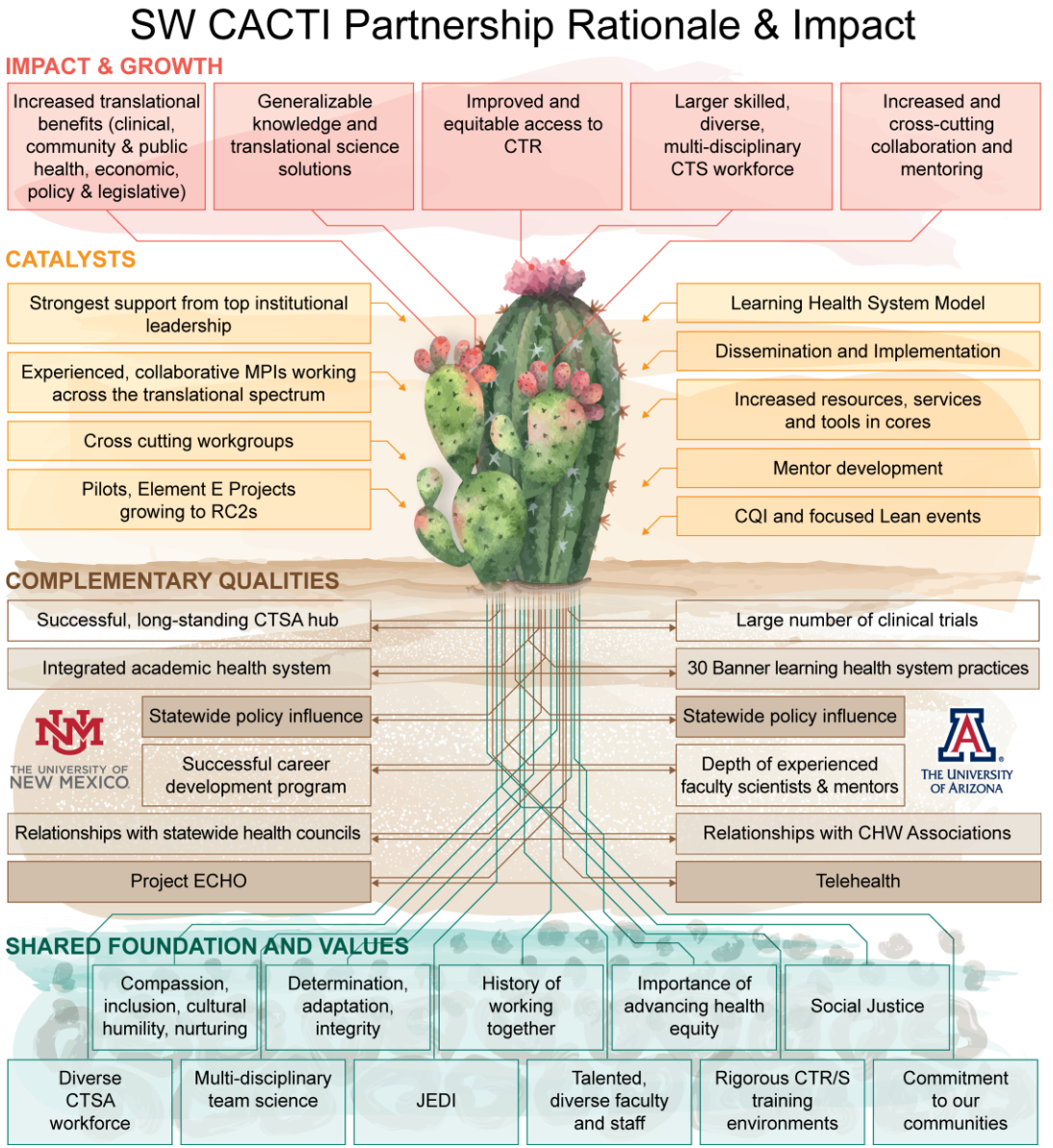
FY 24 CTSC Impact on Annual HSC Funding



SW CACTI Clinical and Translational Science Award (UM1)

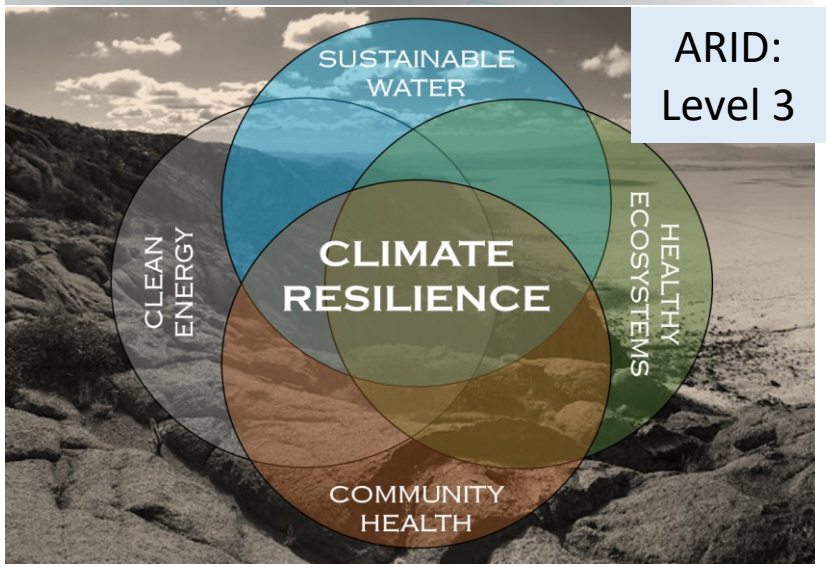
NIH / National Center for Advancing Translational Sciences, 6/1/25 – 5/31/32, $38,532,702, *competitive renewal*

To remove barriers to translational science, accelerate clinical translational innovation, and advance health equity in the United States Southwest (SW) region, the University of New Mexico (UNM) and the University of Arizona (UArizona) have partnered to form the Southwest Center for Advancing Clinical and Translational Innovation (SW CACTI).



How has UNM's Grand Challenges program grown?

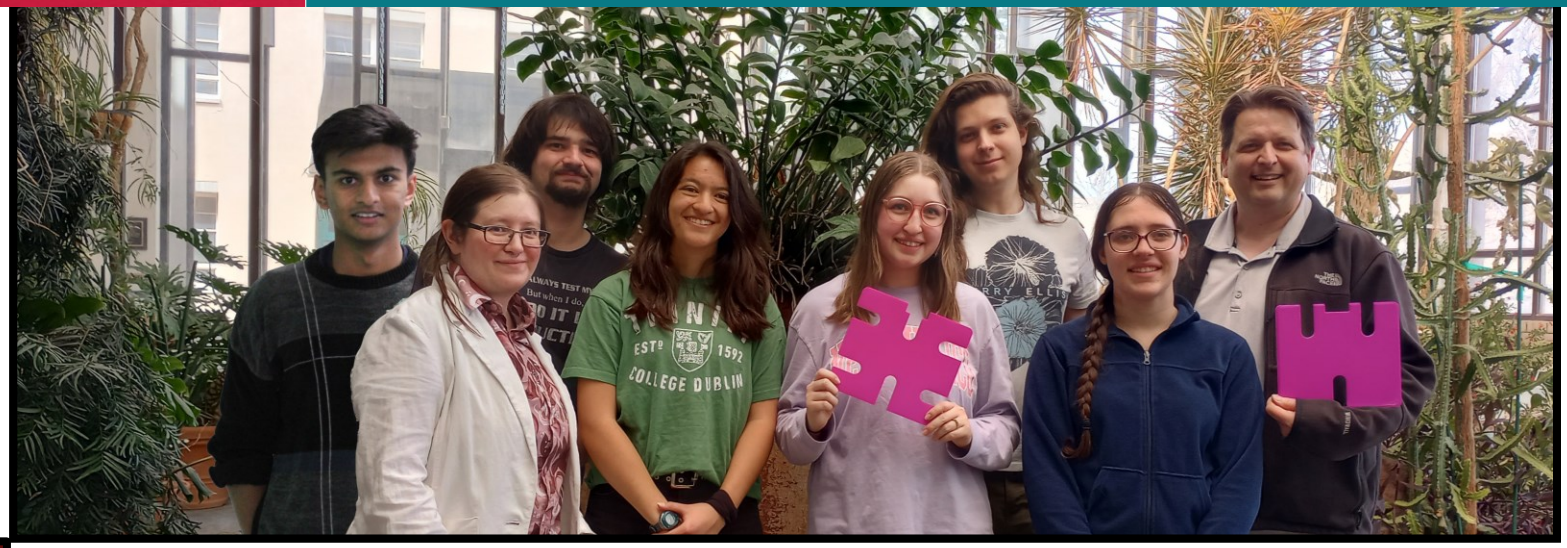
- New Structure & Philosophy
  - **Broader in scope - truly cross-campus**
  - Funding – President, HSC, OVPR
  - **Promoting culture of collaboration**
  - Multiple entrances & exits
- New Steering Committee
  - More inclusive
  - External & internal partners
- New Teams
  - Levels 1 & 2
- Possible fellowship program
  - Vertically-integrated grad-undergrad
  - Focused on Level 2 teams & interdisciplinary co-curricular activities



ARID: Level 3

Sustainable Space Grand Challenges Team

Our mission is to expand New Mexico's scientific, creative, and economic horizons beyond Earth through university, commercial, and national lab collaboration.



- 3-pronged strategic approach
  - Research, Education, Communication
- ~40+ team members (STEAM departments)
  - 9 research focus areas
  - SpaceValley Foundation connections
- >$8.5M in new funding
- Students/Workforce development
  - NASA MINDS team
  - Curriculum development & K-12 outreach activities
  - Artemis in 3D STEAM Challenge & Training Program

https://grandchallenges.unm.edu/space.html

Just Transition to Green Energy Grand Challenges Team

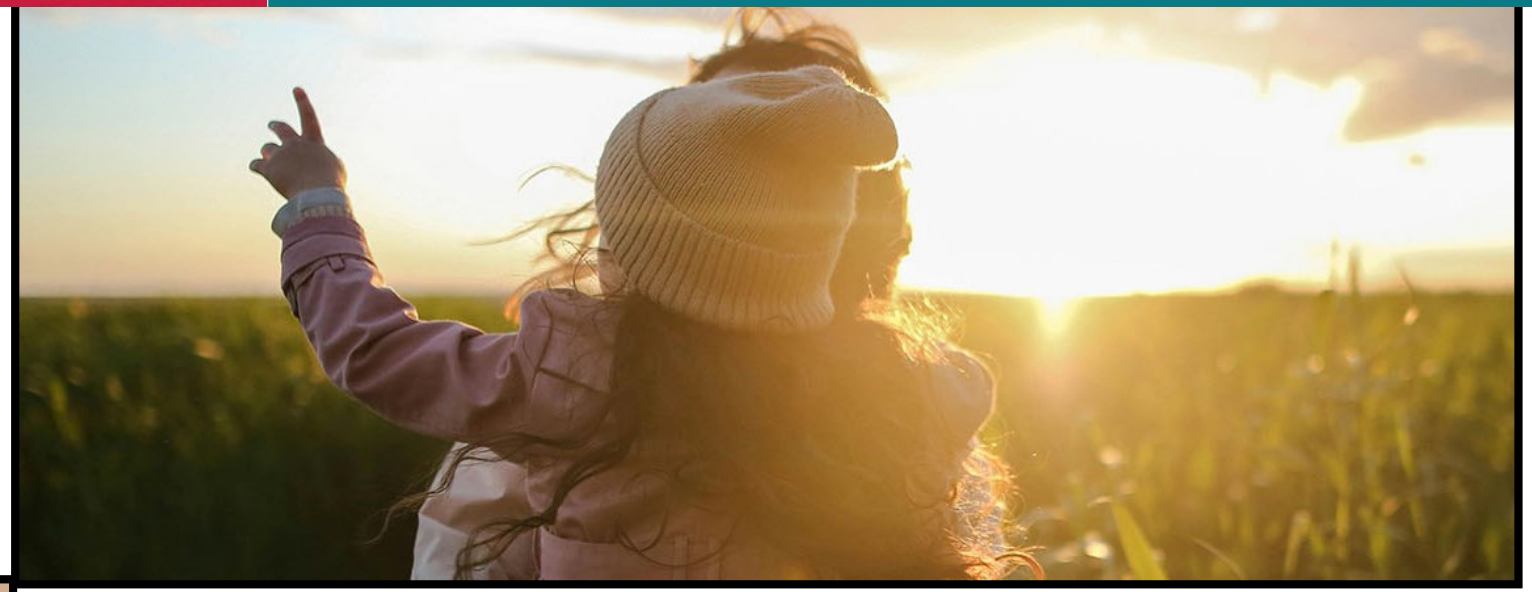
Our mission lies in creating economic opportunities and equitable pollution reduction for communities in the transition to clean energy and climate resilience.

- Developing inclusive, just solutions to energy transitions
  - Policy
  - Community-centered projects
  - Partnering with State of NM
- Currently 10 team members
  - Policy & Law
  - Population Health
  - Engineering
  - Management
- Funding from broad-based approach: ~$550K in new funding
  - Federal agencies, state & local government (~$2M pending with EPA)
  - Private foundations
- Students/Workforce development
  - Graduate fellows & Undergraduate interns

https://grandchallenges.unm.edu/justtransition.html

Child Health Grand Challenges Team

Our mission is to build a systemic approach to improving the lives of children and families by preventing child abuse and neglect in New Mexico.



- Focused on multi-scoped research questions
  - 4 levels: Individual, Family, Community, Society
  - Epidemiology, communications, healthcare, economics, and public policy
- ~24 team members
  - Community engagement
- ~$1.0M in new funding
  - Kellogg Foundation
  - Federal & State agencies
- Students/workforce development
  - Graduate & undergraduate students
  - Medical students

https://grandchallenges.unm.edu/childhealth.html

Aligning university research with State of New Mexico priorities

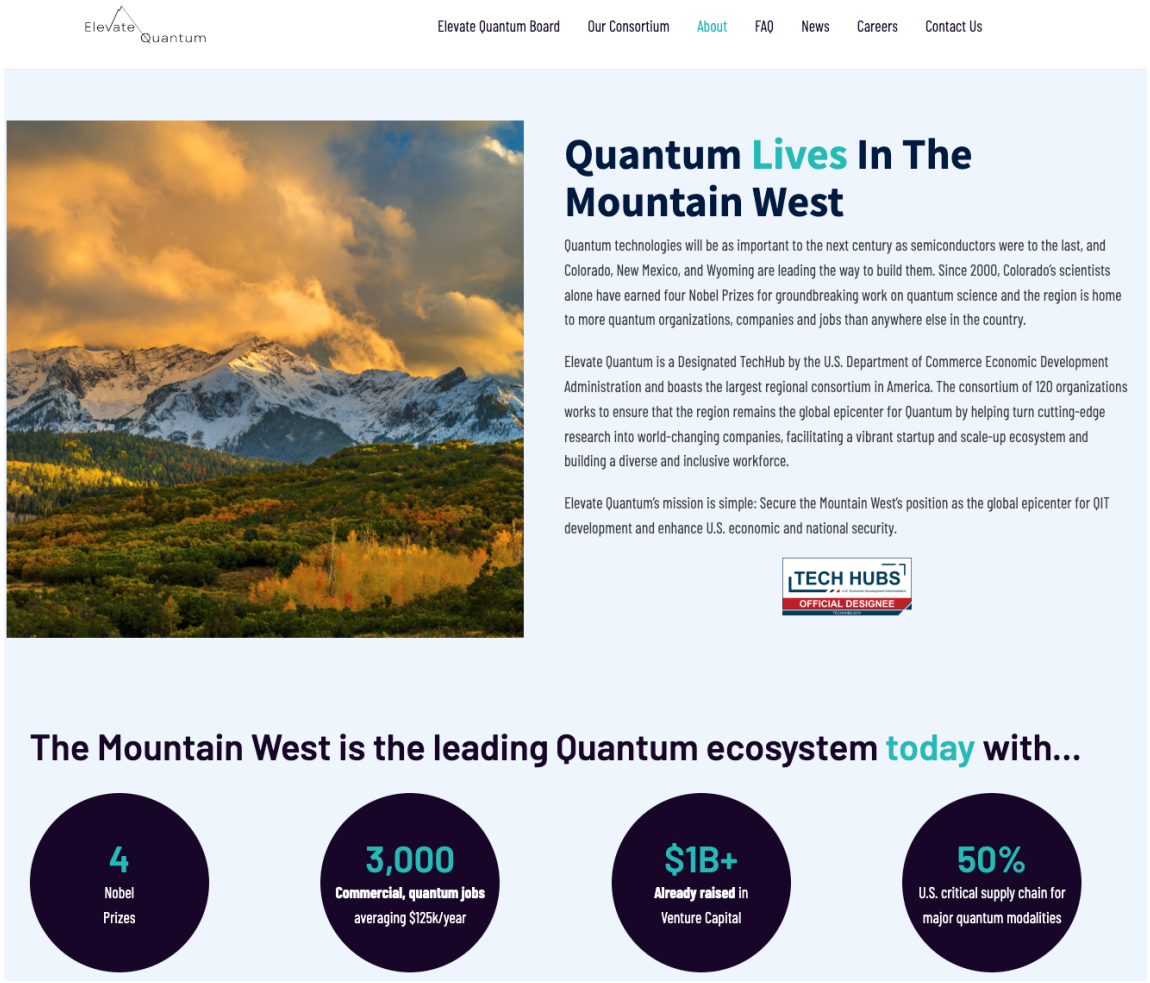
- **Incorporating state agency priorities, interim committee workplans & legislator feedback into our work**
  - Example: We have research that aligns with the target industries of NM EDD
    - Aerospace, Biosciences, Cybersecurity, Intelligent Manufacturing, Sustainable & Green Energy, Health Disparities, etc.
- **Collaborating on targeted large regional funding opportunities for economic impact**
  - EDA Tech Hub award and NSF Engine application on quantum information science & engineering
  - NSF Engine on clean water and clean energy technology development award and new application
  - Memory and aging
  - Substance Use Disorder
- **Special funding programs for state match dollars**
  - Technology Enhancement Fund
  - NM Match Fund
- **State science and technology plan**
  - Guides Federal funding areas through the Established Program to Stimulate Competitive Research (EPSCoR)
    - Current state-wide award is the New Mexico SMART Grid Center,
    - New award is the Research Infrastructure Optimization for New Mexico (RIO-NM), which includes cybersecurity

US Economic Development Administration – success!

EDA Tech Hub Awardee

- CO/NM/WY regional effort branded "Elevate Quantum": $127.5M *over 5 years*
- The **Technology Enhancement Fund** played a big role in "capturing" this opportunity

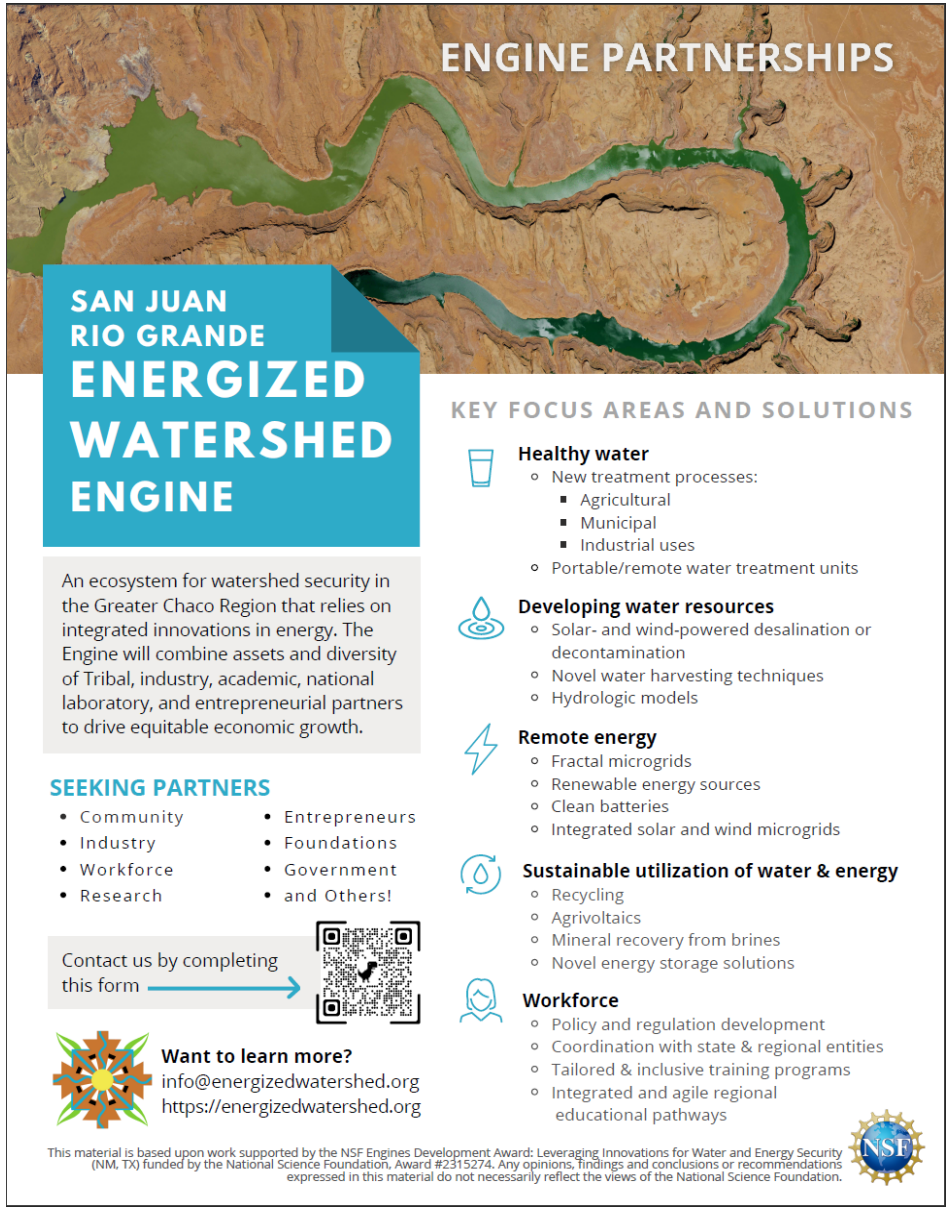
Please wait until 4pm today for the full reveal!



NSF Technology, Innovation & Partnerships (TIP) Success

NSF TIP: Regional Innovation Engines

- Round 1: Semi-finalist and Development Awardee
  - $1M from NSF; $1M from State of NM
  - 2 year grant period
- Round 2: Applying for full engine:
  - Engines receive up to $160M over 10 years
- UNM OVPR leads a regional coalition
  - Alignment of Tribal, industry, government, academia & entrepreneurial partners
  - Development across sectors
- Focus:
  - Clean energy and clean water solutions



Ongoing Evolution of Research Infrastructure Needs

What infrastructure is needed to be successful?

- State-of-the-art, competitive research facilities where 21st century research can be performed by students, faculty, and staff
  - New construction, renovation, and maintenance of existing
- Support for core, shared facilities, including instrumentation and staffing to maintain competitiveness
- Advanced computer hardware and broadband bandwidth increasingly needed
- Pre-planned buildings and selected sites – expensive but required for large construction grants
- Collaborative spaces to work jointly with industry and community and across disciplines
- Secure facilities (e.g., SCIFs) for some government contracts

Collaboration Is Key To Success

To summarize a few of our collaboration examples:

- Grand Challenges
- EPSCoR
- EDA Tech Hub (Quantum)
- **Technology Enhancement Fund**
  - Success story: Sevilleta Long-Term Ecological Research Program – we received significant funding from TEF to support this NSF program, which is a state-wide effort
  - Technology Enhancement Fund (TEF) awards and related decisions of funding distributions are a collaboration between HED, EDD, UNM, NMSU, New Mexico Tech, and Navajo Technical University
  - Research universities are working with HED on refining state TEF statutes and rules, including another forthcoming appropriations request for the upcoming session

Other Examples of Collaborative Successes

- **New Mexico Alzheimer's Disease Research Center**
  - Federal P30 grant, funded by NIH / National Institute of Aging
  - Schools of Medicine, College of Arts &Sciences, MRN, ECHO

- **Southwest Node of the NIDA Clinical Trial Network**
  - Federal UG1 grant, funded by National Institute on Drug Abuse
  - Schools of Medicine, College of Arts & Sciences

- **UNM Climate Change and Health for the Alliance and Novelty of Geospatial and Exposure Science (CHANGES) Center**
  - Federal P20 grant, funded by National Institute of Nursing Research
  - Schools of Engineering, EDAC, Geography, Nursing, Medicine, Pharmacy

Thank you to the New Mexico Legislature, our Executive leaders, federal research agencies and our community partners for their collaborative support of UNM research

Together, we are:

- *creating public knowledge for the public good,*
- *diversifying New Mexico's economy*
- *establishing guideposts for the future of education & health care delivery, and*
- *supporting high-quality jobs for New Mexicans*

Questions?