Engaging with Communities on Broader Impacts Work

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What are Broader Impacts (BI)?

- Also referred to as Outreach Efforts by some sponsors
- The potential of a sponsored project to benefit society and contribute to the achievement of specific, desired societal outcomes

Potential Target Outcomes for BI

- Full participation of women, underrepresented minorities in STEM, and persons with disabilities
- Improved STEM education and educator development (at any level)
- Increased public scientific literacy and public engagement with science and technology
- Improved well-being of individuals in society
- Development of a diverse, globally competitive STEM workforce
- Increased partnerships between academia, industry and others
- Improved national security
- Increased economic competitiveness
- Enhanced infrastructure for research and education

Outreach might imply…

- Academic work done “for” the public
- Applying existing knowledge
- Unidirectional flow of knowledge (university → public)
- Distinction between knowledge producers & knowledge consumers
- Primacy of academic knowledge
- University as center of public problem solving

Engagement refers to…

Academic work done “with” the public
Inclusive, collaborative, problem oriented
Multidirectional flow of knowledge (university ←→ public)
Co-creation of knowledge (university + community – solutions)
Shared authority for knowledge creation (both universities and communities have relevant knowledge & expertise)
University as part of an ecosystem of knowledge production addressing public problem solving
Community change that results from the co-creation of knowlege

Benefits to Society

- Co-creation of knowledge
- Sustainable transfer of knowledge
- Generates true empowerment approaches to community development
- Creates mutually beneficial outcomes
- Creates public support for solutions-focused partnerships
- Creates public support for PreK-12 educational improvements
- Potentially involves (impacts) whole community (diffusion)
- Creates transdisciplinary partnerships
- Creates startup companies, product improvements, innovation and workforce development
- Enhances quality of research and evaluation
  - Implementation & Fidelity
  - Reliability & Validity
  - Diffusion & Dissemination

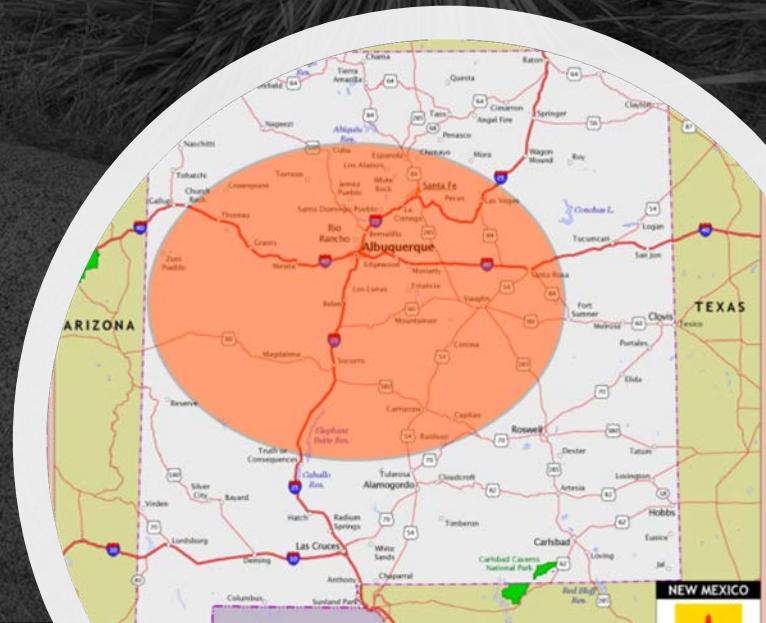
Community Engaged Scholarship is…

- Scholarship focused (Goal oriented toward change)
- Community-based (Systems oriented)
- Mutually beneficial
- Capacity Building
- Sustainable
- To serve a larger public good

What do we mean by “community”?

GEOGRAPHIC

Shared physical space such as a neighborhood, city, or region.



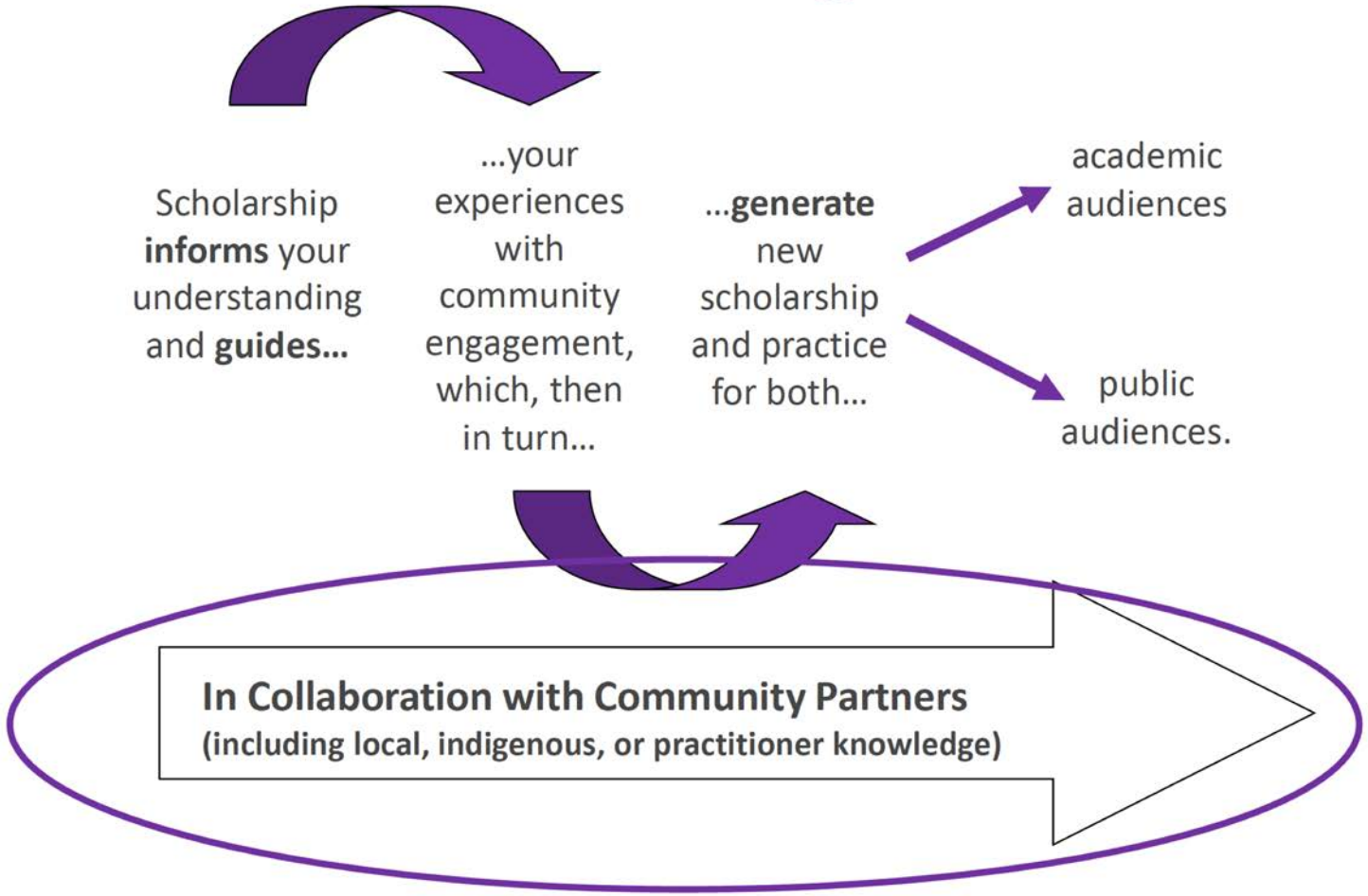
More definitions of "community"

Identity	• Shared race, gender, or other characteristics
Affiliation or Interest	• Shared common set of values or concerns
Circumstances	• Shared common experiences, e.g. surviving natural disaster or managing a disease
Profession or Practice	• Shared specific knowledge to occupation, skill, or trade
Faith	• Shared belief systems, customs, and religious or spiritual practice
Family/Kin	• Shared relationships through family and/or marriage

Engaged Research & Creative Scholarly Approaches to BI

- Use-inspired basic research
- Community-based research
- Community-based Participatory research
- Applied research
- Contractual research (funded by government, NGOs or businesses)
- Demonstration projects
- Needs and assets assessments
- Program Evaluations
- Translational scholarship through presentations, publications and websites
- Exhibitions, performances, and other creative activities

"Engaged" Incorporates Community Knowledge



What is the Infrastructure to Support BI?

- ADVANCE Team
- Office of Community Engaged Learning & Research
- Faculty Research Development Office
- UNM Pre-College Programs (CEP, Upward Bound)
- K12 Community Partnerships (APS)
- Museums (Explora, Natural History Museum, ABQ Art Museum, BioPark)
- STEM NM Ecosystem

As a Researcher, What Can My Broader Impact Be?

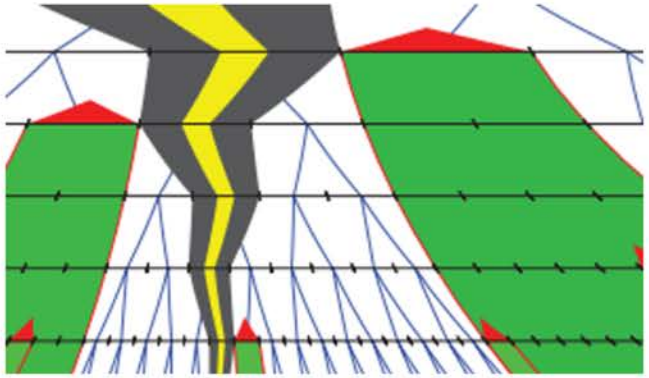
Converting solid waste materials into road surfacing material to develop longer-lasting, quieter road surfaces

Using math and statistics to improve predictions of severe weather

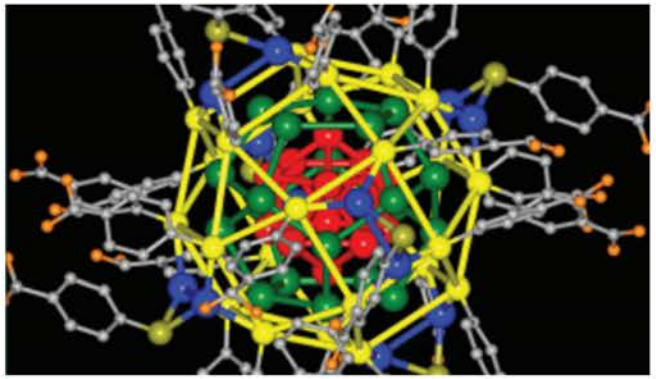
Analyzing evolution of massive storms to develop better understanding and improve forecasting and resilience planning.

Proposed Research Itself Defines the Broader Impact

Advancement of computer architecture that could improve energy efficiency and battery life.



Harmonic analysis research with applications in big data, image processing, and wave propagation.



Improve photovoltaic technology with the potential to improve solar cell efficiency and reduce costs.

Proposed Research Directly Contributes to Broader Impact

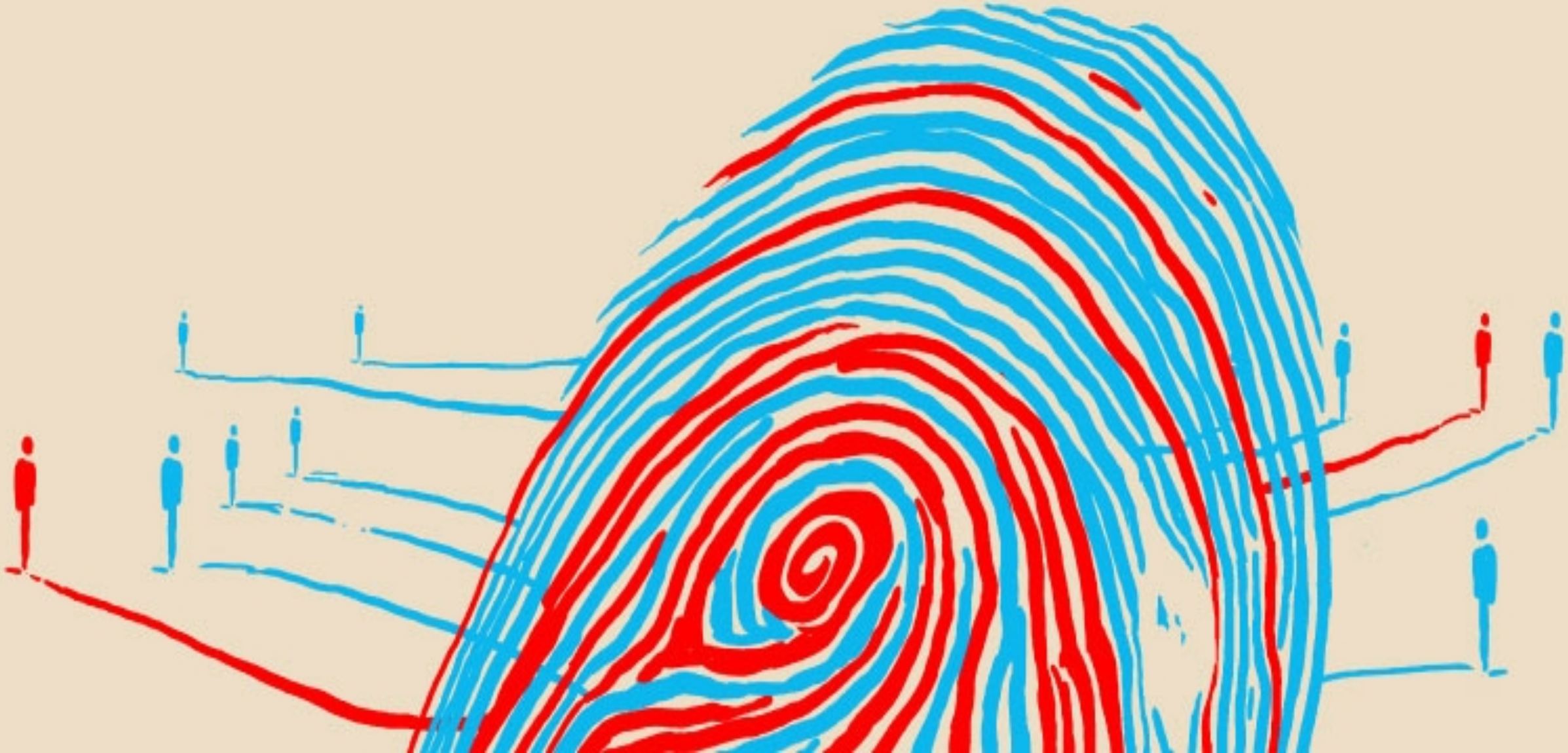
Research studies early language and bilingual education. BI is to collaborate with organizations and policymakers to develop science-based programs.

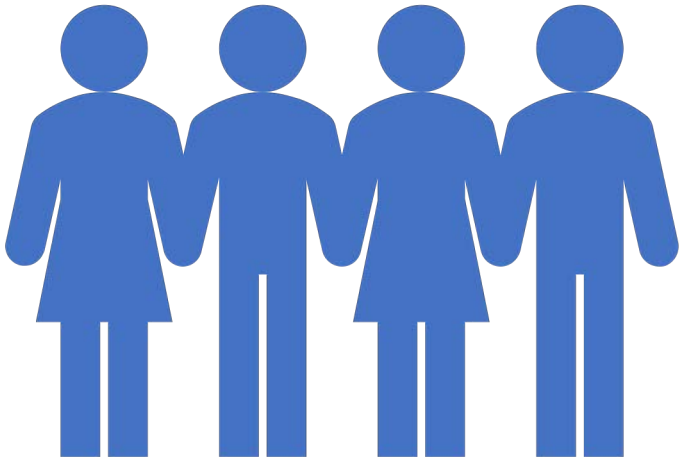
Museum exhibit that displays technological advances being made to restore and extend human abilities. Shares engineer's stories with general public.

Research studies use of organic semiconductors. BI fosters interest in polymer science with chemistry ambassadors to underrepresented teens.

Proposed Research is Complemented by Broader Impact Activities

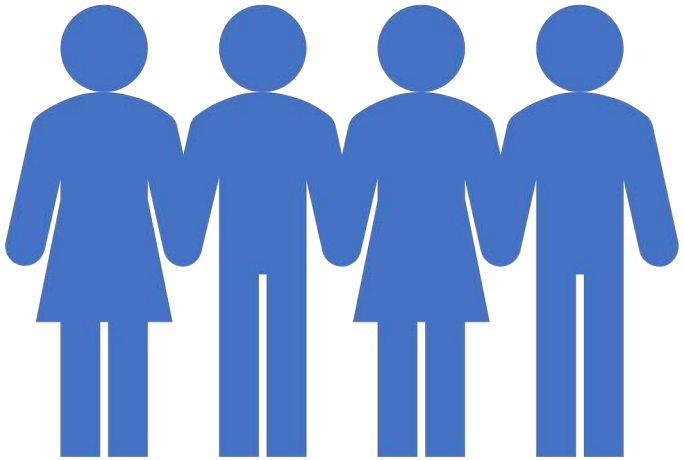
What is your Broader Impact Identity?





Finding your Broader Impact Niche

- How does your research naturally connect to societal needs and issues?
- Which societal needs and issues **most** connect to *you* and your work?
- What societal change do you want to see as a result of your work and why?



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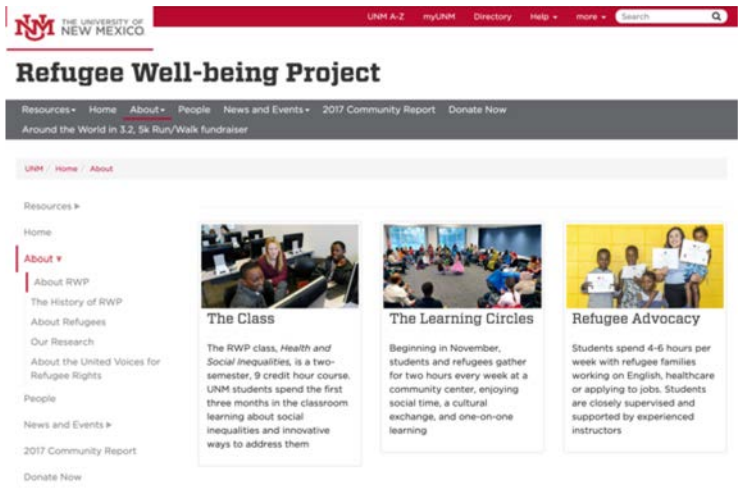
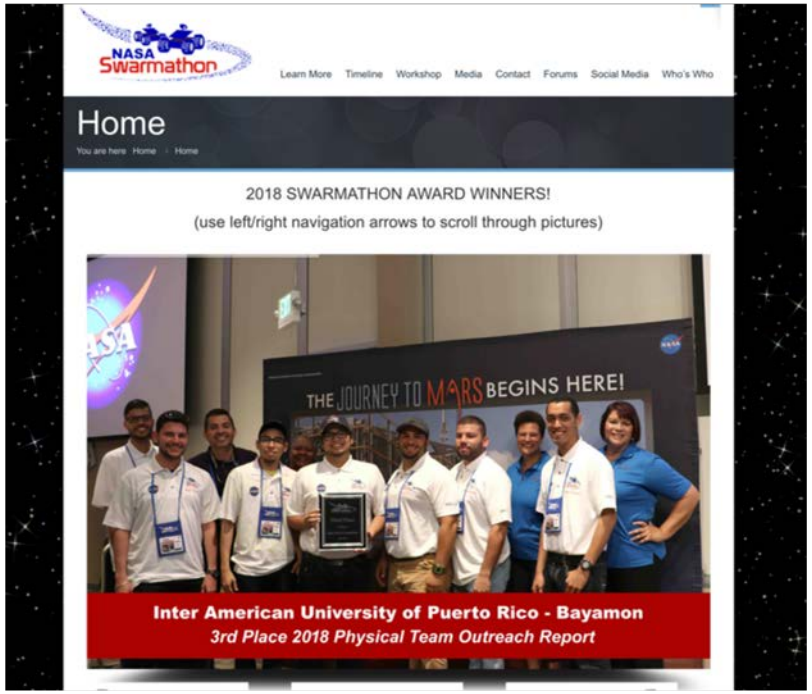
Also Known As…
Broader Impact Goal

Examples of Community Engaged Approach to Outreach



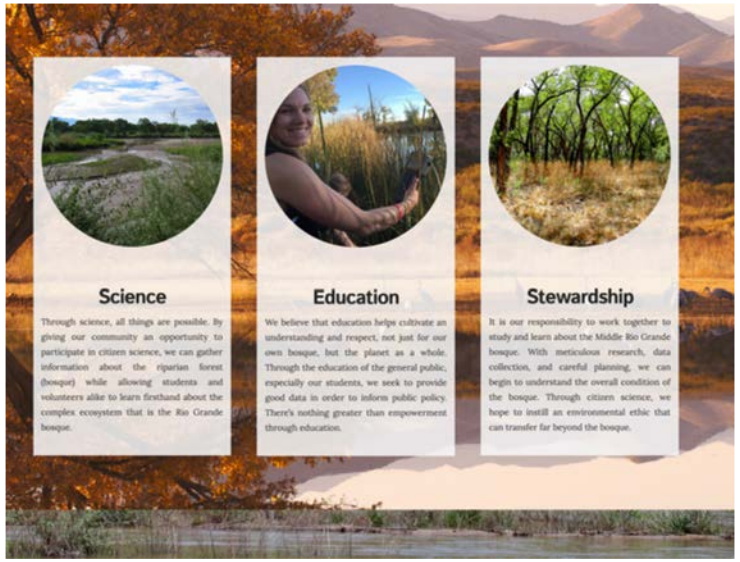
Refugee Well-Being Project

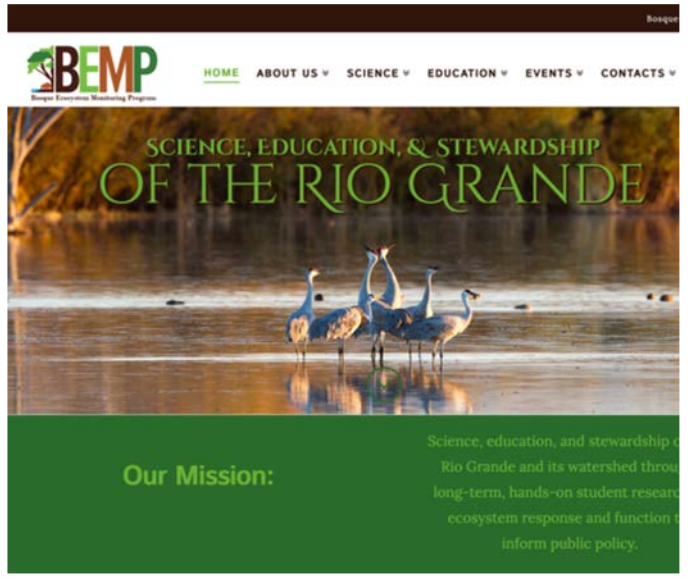
PI: Jessica Goodkind, Sociology



NASA Swarmathon

PI: Melanie Moses, Computer Science



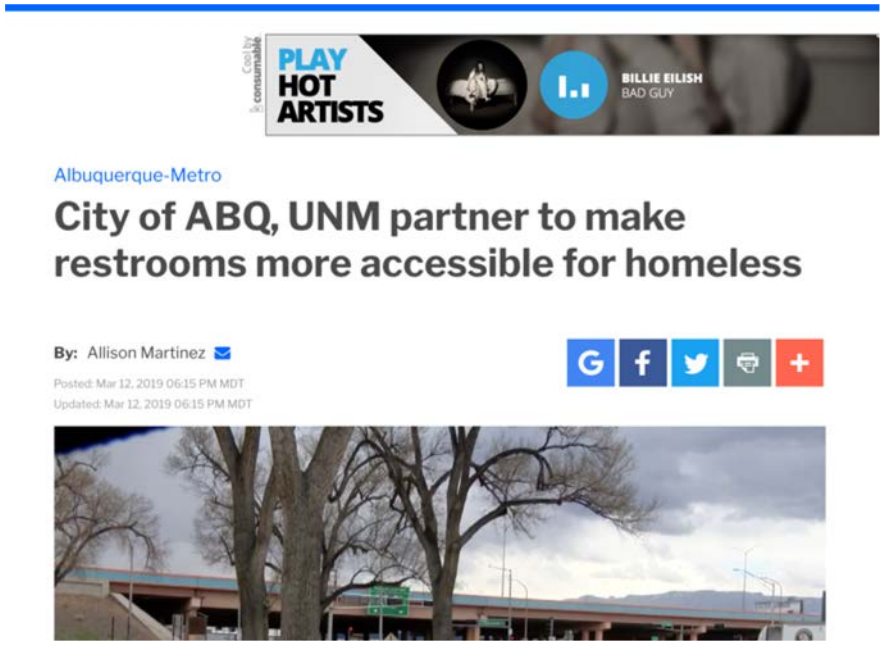


Bosque Ecosystem Monitoring Project

PI: Kim Eichhorst, Biology

HEALTH INCLUSION VIBRANCY EQUITY

A Campus and Community Collaborative

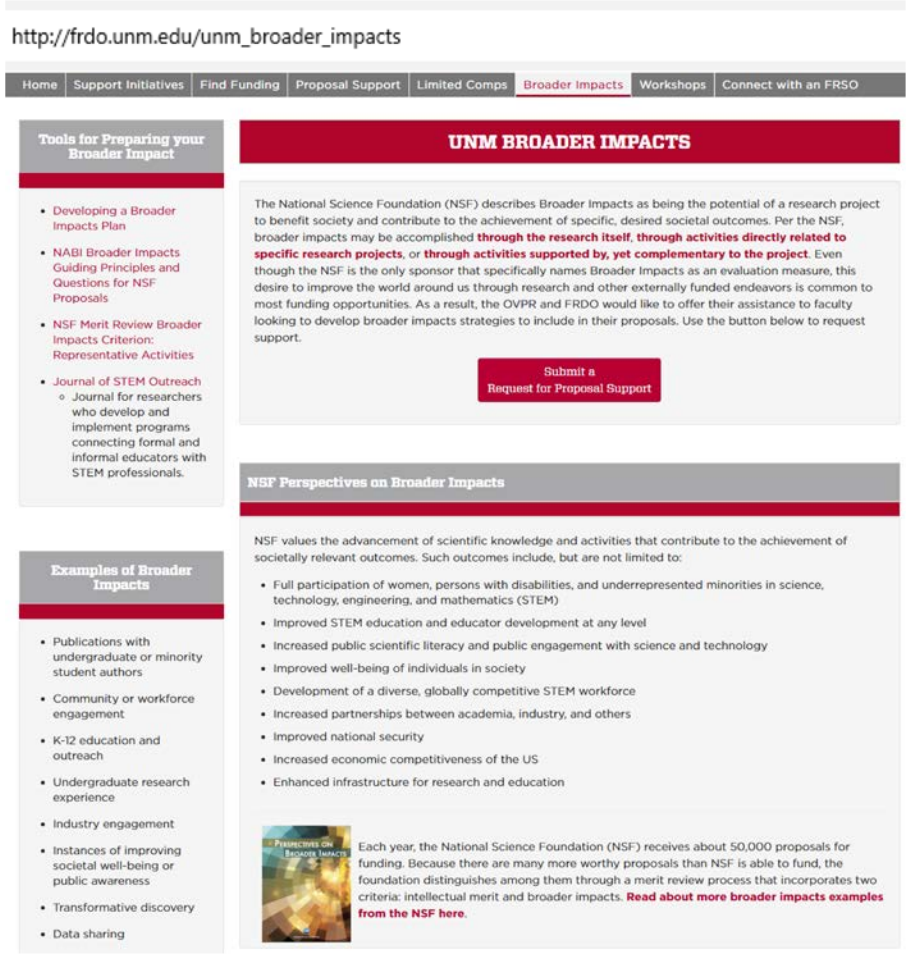


HIVE

Community of Practice

Reaching your Broader Impact Goal

- What people, programs, expertise, partners, institutions, and tools do you already have access to that can help you reach your impact goal?
- What other people, programs, institutions, partnerships, etc. do you need?



Online Tools Available

- NSF Perspectives on Broader Impacts - https://www.nsf.gov/od/oia/publications/Broader_Impacts.pdf
- National Alliance on Broader Impacts (NABI) - https://broaderimpacts.net/
- Broader Impacts at UNM - http://frdo.unm.edu/unm_broader_impacts

Mission: Graduate

Mission: Graduate is a partnership that brings together educators, employers, educational support providers, government leaders, and citizens to design collaborative projects and align organizational practice and policy toward achieving **common goals**. They seek partners with interest, experience, & expertise needed to successfully realize their **seven core outcomes**.

Girls in STEM Groups

These New Mexico groups are devoted to engaging primarily K-12 girls in STEM. The NM Girls Connection Programs and NM Out-of-School Time Network links includes an assortment of programs.

NM Girls Connection Programs
NM Out-of-School Time Network
Girl Scouts of New Mexico Trails
Expanding Your Horizon (EYH) ABQ
STEM Santa Fe

Industries in NM

Industry collaborations are positive outcomes of some broader impacts. Below are links to some industries in New Mexico already working to improve STEM education and may be productive partners in your proposal.

Key Albuquerque Industries
Boeing
Honeywell
Intel
Northrop Grumman
Raytheon

Research Data Support

Effective open source software and data sharing can be incorporated into **broader impacts**. The Research Data Services provides a variety of services in support of effective research data planning, management, preservation, discovery and use. In addition, the RDS team also provides support for several key research data infrastructure capabilities that are maintained by the Library for use by UNM's research community.

CSTA New Mexico

The Computer Science Teachers Association (CSTA) supports and promotes the teaching of computer science. CSTA provides opportunities for K-12 teachers and their students to better understand computer science and to more successfully prepare themselves to teach and learn. The NM chapter offers a ways to get involved with CS teachers helping to shape CS education in New Mexico.

Albuquerque Museums

Below are links to contact information for local museums.

¡Explora!
Albuquerque Museum
Indian Pueblo Cultural Center
International Balloon Museum
Museum of Nuclear Science & History
National Hispanic Cultural Center
NM Natural History Museum

NM STEM Connection

Managed by the UNM STEM-H Center for Outreach, Research and Education with support from the NM Experimental Program to Stimulate Competitive Research (NM EPSCoR), the NM STEM Connection provides information about STEM resources for **K-12 students**, **teachers**, **parents**, **counselors**, and **administrators** as well as **higher education faculty/staff** and **community members** in New Mexico.

UNM STEM University

STEM University is a collection of **free** outside-of-class activities related to science, technology, engineering and mathematics disciplines (STEM) put on by the STEM Collaboration Center. These events connect UNM students with STEM research, scientists, technology and leadership. Faculty can post STEM events by following this **link**. Click **here** to access the current list of STEM University events.

UNM Outreach Organizations

Organizations on campus devoted to the recruitment, retention, and education of students from minority and underrepresented groups.

African American Student Services
American Indian Student Services
El Centro de la Raza
Native Americans in STEM (NASTEM)
Project for NM Graduates of Color
Ronald E. McNair Scholars Program
Student Support Services
UNM Division of Equity and Inclusion

UNM College Based Outreach

A number of schools and colleges at UNM offer outreach opportunities. These are excellent places to begin your own outreach effort, either as an example to follow or as a collaborative partner. Check out the links to their outreach pages below.

College of Arts & Sciences
College of Education
College of Fine Arts
School of Architecture & Planning
School of Engineering

New Mexico EPSCoR

One mission is to cultivate a well-qualified and diverse Science, Technology, Engineering and Mathematics (STEM) workforce and develop a strong culture of innovation and entrepreneurship. Through collaborations with organizations ranging from afterschool programs to colleges and universities, from museums to business startup accelerators, NM EPSCoR Education and Outreach programs serve a wide range of audiences across the state.

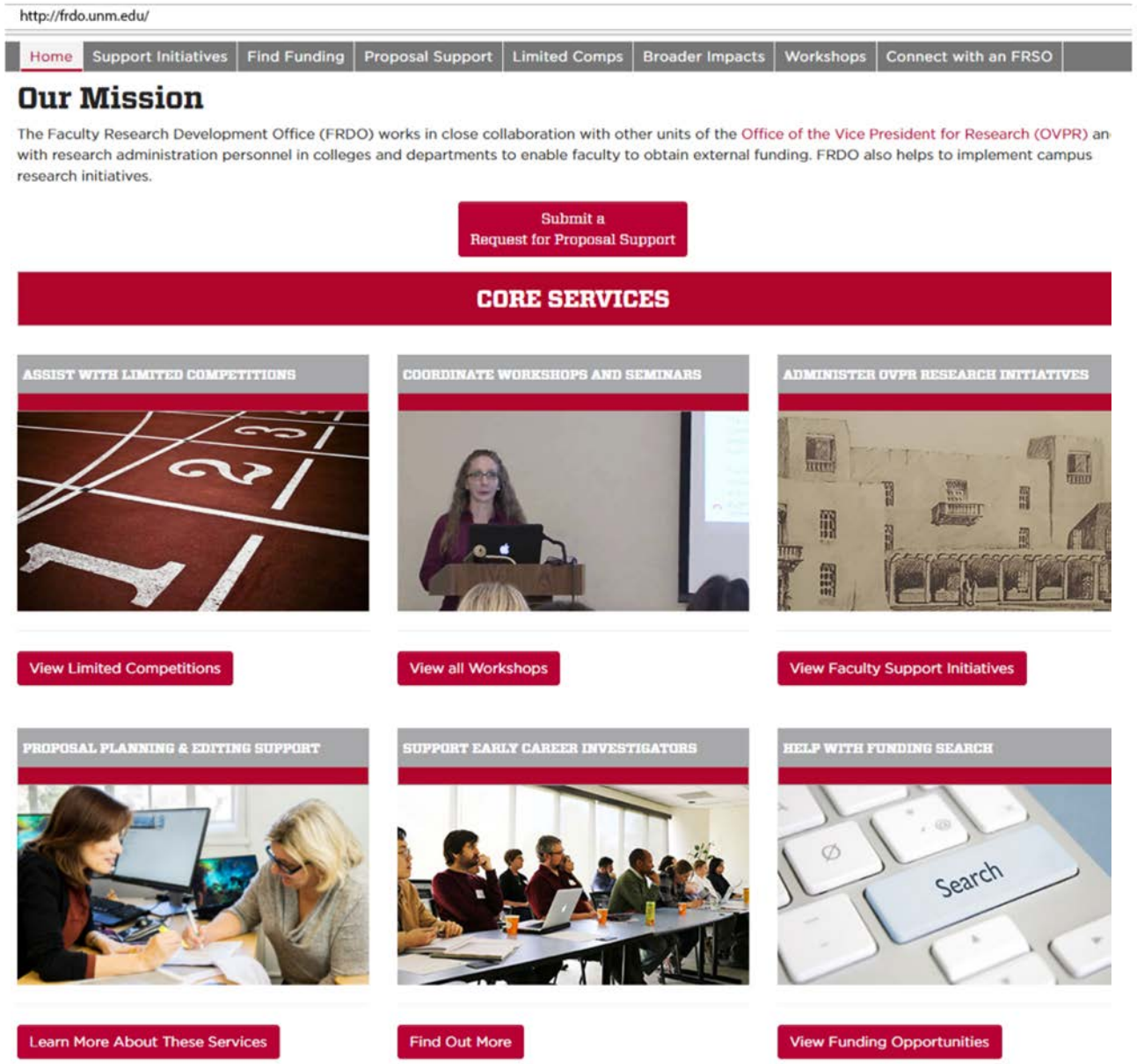
Government Labs in NM

Military and National Labs in New Mexico participate in a variety of outreach efforts. Some of them may provide examples to follow while others will include opportunities for partnerships. Check out the links to their outreach pages below.

Air Force Research Lab
Los Alamos National Laboratory
Sandia National Laboratories

Campus Resources

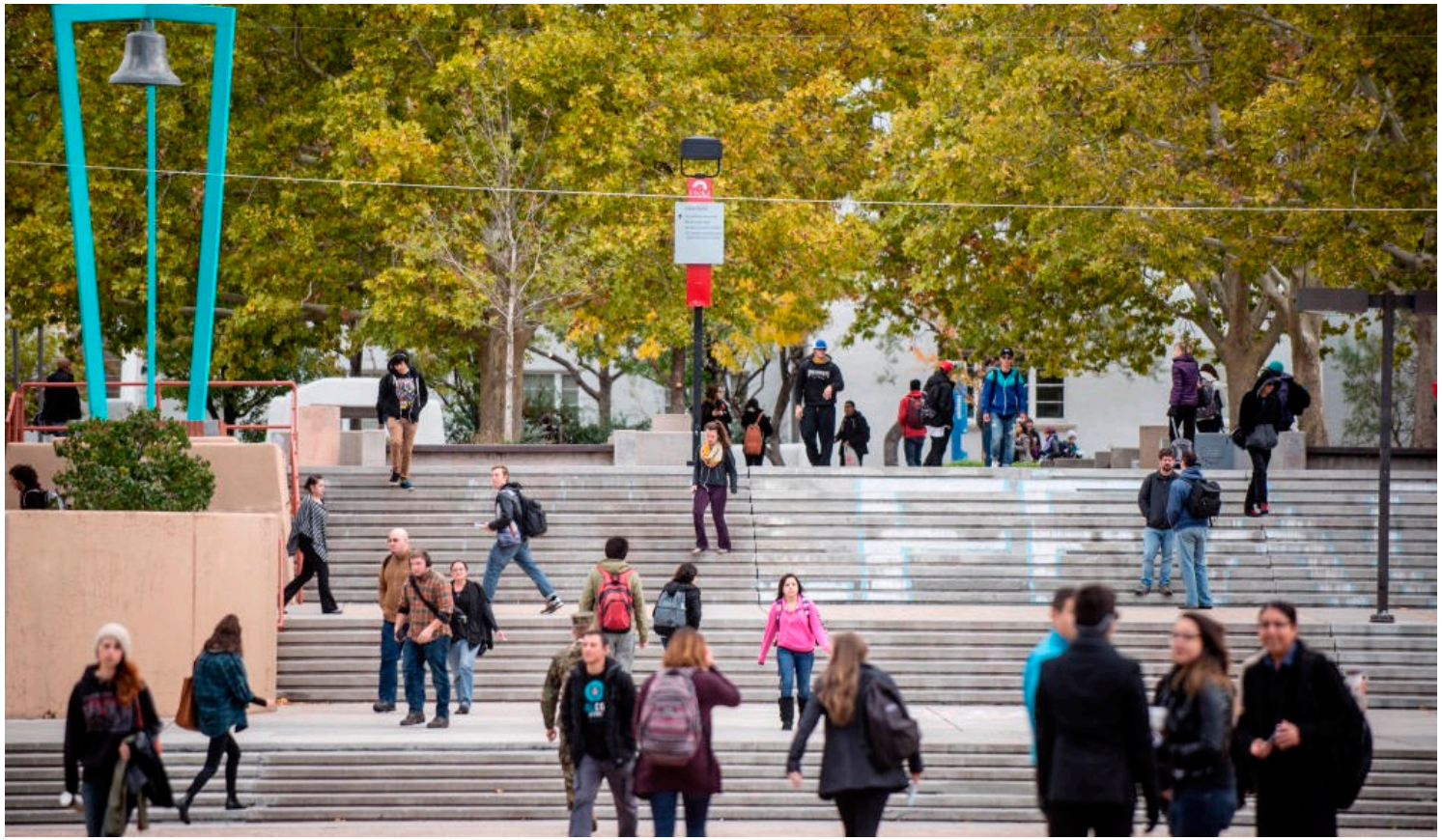
- K-12 Specialists
- Undergraduate Specialists
- Underrepresented and/or Minority Group Specialists



Request support from the Faculty Research Development Network by clicking this link.

K-12 Specialists

- NM STEM-H Center
  - Karen Kinsman (Director)
  http://nmstemh.org/
- NM MESA
  - Kim Scheerer (UNM Contact)
  http://www.nmmesa.org/
- Engineering Student Success Center
  – Elsa Castillo (Asso. Director)
  https://ess.unm.edu/index.html
- ABQ Math Teachers' Circle
  - Michael Nakamaye (UNM Prof.)
  http://www.unm.edu/~mathtc/index.php



Undergraduate Specialists

- Research Experience for Undergrads
  - Nanoscience & Microsystems - https://reu.unm.edu/
  - Biology - https://sevilletareu.wordpress.com/
  - Physics & Astronomy - http://physics.unm.edu/pandaweb/undergraduate/reu.php
- Student Support Services http://ssstrio.unm.edu/
- STEM Collaborative Center https://stem.unm.edu/
- STEM University https://stemuniversity.unm.edu/
- Engineering Student Success Center https://ess.unm.edu/index.html

Underrepresented/Minority Groups Specialists

- Student Support Services
  http://ssstrio.unm.edu/
  - African American Student Services
    http://afro.unm.edu/
  - American Indian Student Services
  - https://aiss.unm.edu/
  - El Centro de la Raza
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  - TRIO Program
  - http://ssstrio.unm.edu/
- Ronald E. McNair Scholars Program
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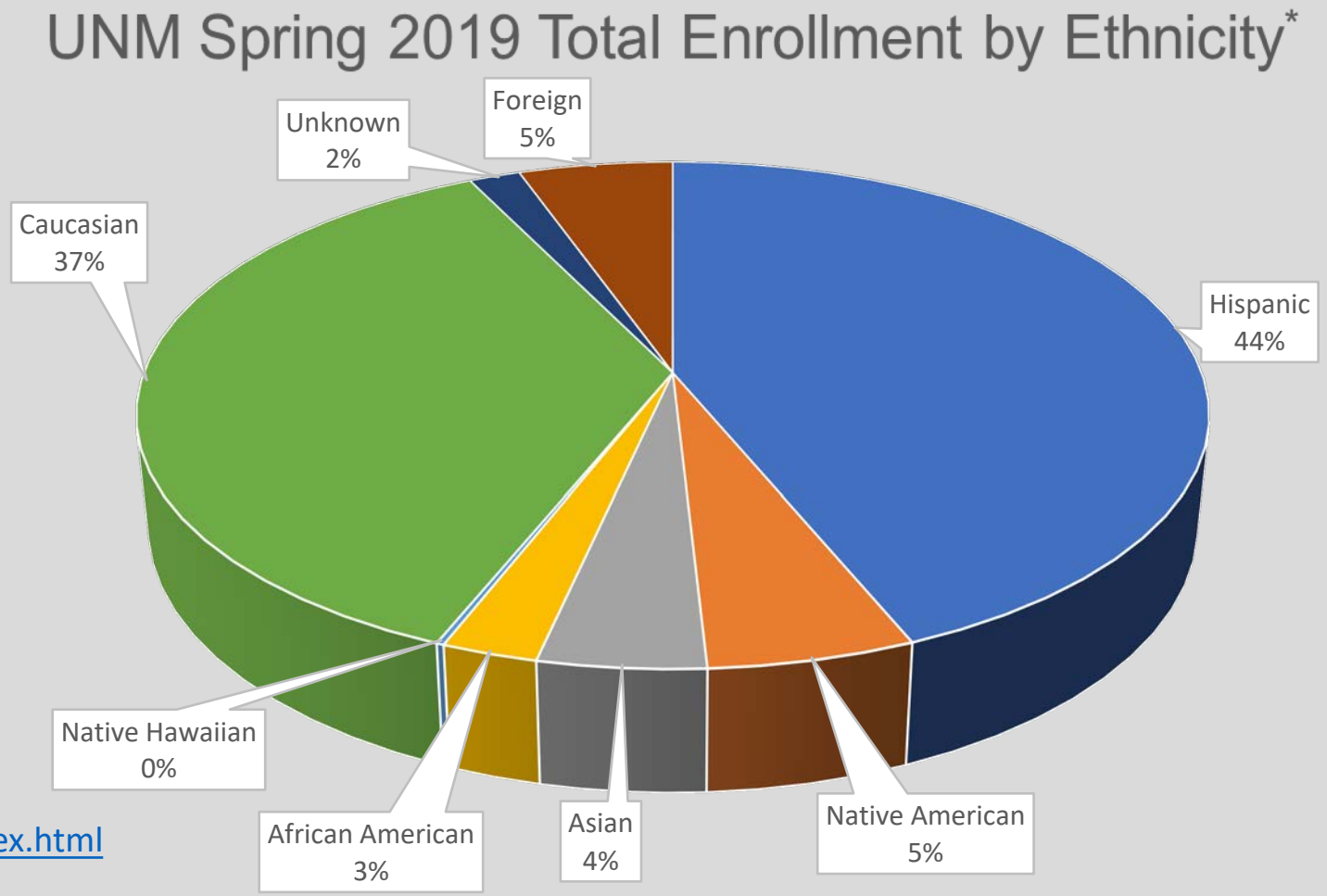
  http://pnmgc.unm.edu/
- Native Americans in STEM (NASTEM)
  https://ess.unm.edu/programs/nastem/index.html



*http://oia.unm.edu/facts-and-figures/oer-spring-2019.pdf

UNM + Explora Broader Impacts Partnership

Anthony Salvagno, X Studio Programs Mgr
asalvagno@explora.us

STEM NM Ecosystem

STEM-NM

Contact

Mitchell Whittier
STEM-NM Manager
Explora
mwhittier@explora.us

Current Initiatives

12 MONTHS OF MATH

DISCOVER

Math in Real Life!