

# Are we doing science right?

*Questions across the scientific enterprise*

**Lisa Margonelli**

Editor-in-Chief

*Issues in Science and Technology*

May 22, 2024

**ISSUES**

## What the community is concerned about:

- Science communication
- Research security
- Research reproducibility
- Research novelty
- Problem solving
- Engaged research
- Interdisciplinary research
- Diversity in STEMM
- Inclusive excellence in STEMM
- Sexual harassment
- Bullying
- Open science
- Preparation of STEMM workforce for jobs
- Threats: AI, climate change, misinformation

Question 1:

Are we doing the right science  
for the enterprise's goals?

# Goal: Foster Regional Economic Development



National Science Foundation  
Regional Innovation Engines Program

## Concept Outlines Explorer

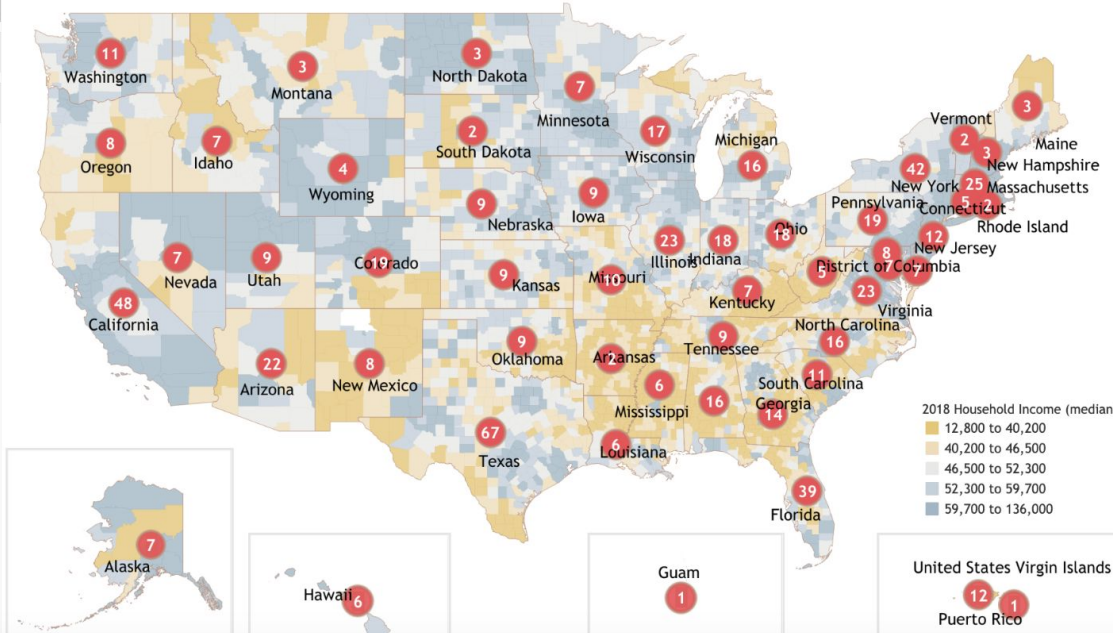
Search by Theme (and more) [🔗](#) Search By State [🔗](#) **Overview**

Map View of Submissions by Lead Organization State [?](#)

- By Organization State**
- By Lead Organization
- By Region of Service

Overlay by county  
Household Income  Population

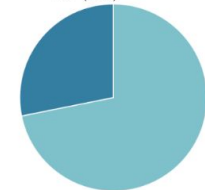
Filter(s):  
NSF Engines Type  
 (All)  
 Type 1 Proposal  
 Type 2 Proposal



### Concept Outline Submission Metrics

Number of Submissions Advancing	679
Number of Distinct Submitting Organizations	520
States and US Territories Submitting	54

### NSF Engines Type-2 Proposal



To access the full list of submissions advancing:  
<https://airtable.com/shrnjX8JQgtHv>

**1984:** Scientific research and tech innovation as “a prime force for economic development and job creation.”



The Microelectronics and Computer Technology Corporation at UT Austin's J.J. Pickle Research Campus. 2004

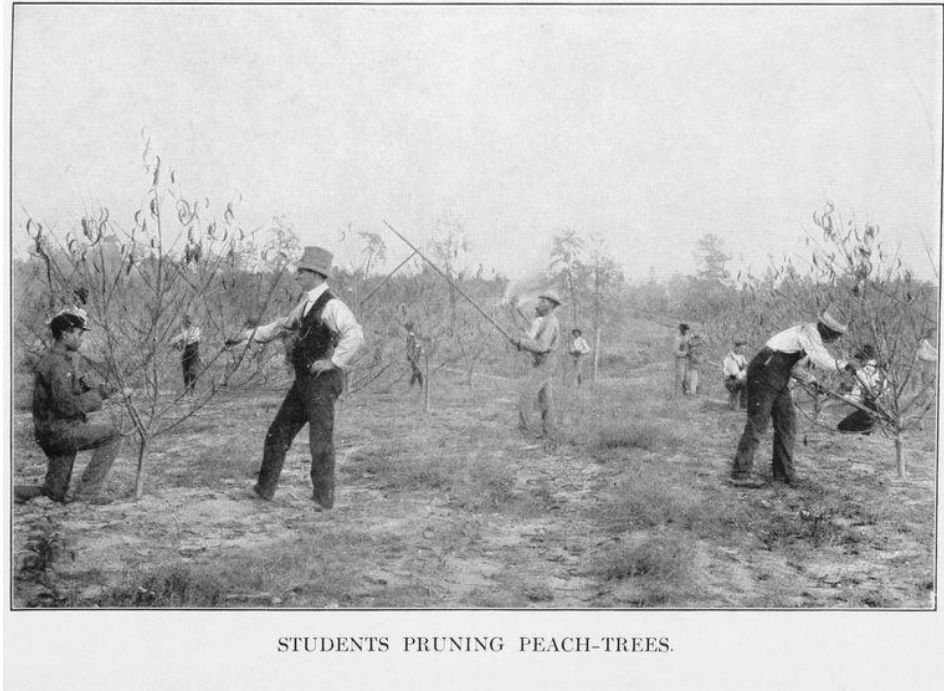
*Image: Larry D. Moore*

## 2024: Placemaking for “continual outward growth”



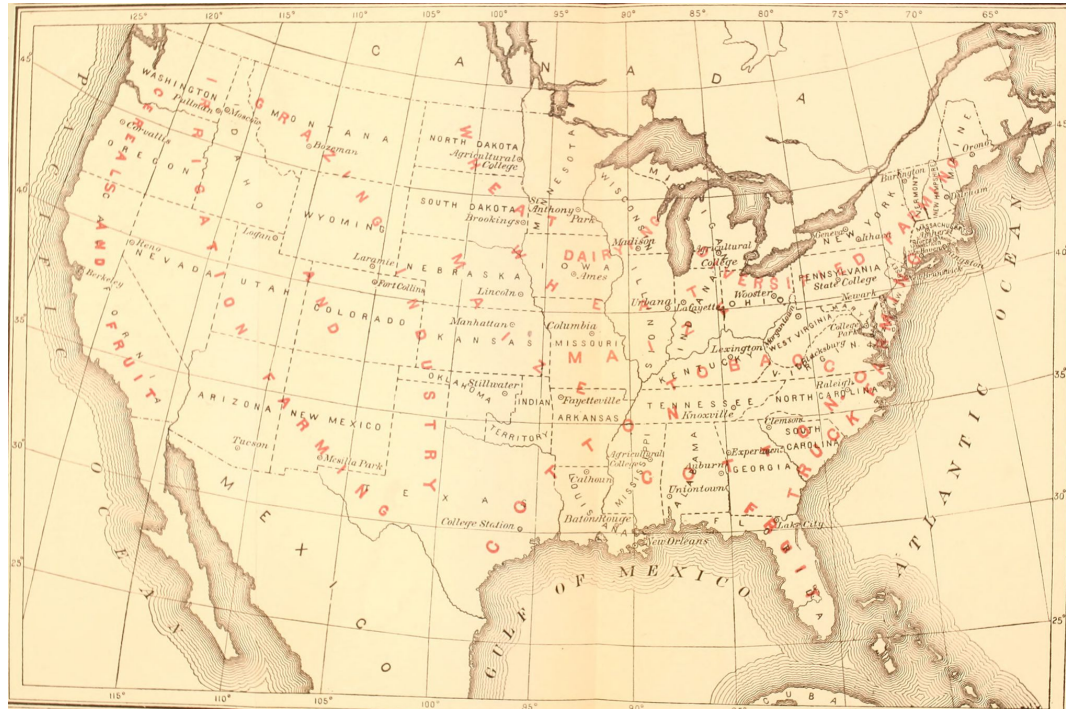
Architect's rendering of concept for redevelopment at UT Austin's J.J. Pickle Research Campus

# 1875: The peach was a force for economic development



*Images: USDA Pomological Watercolor Collection  
& Schomburg Center for Research in Black Culture*

# Outreach evolves: experiment stations and extension



1887's Hatch Act set up semi-autonomous agricultural experiment stations focused on local crops and ecosystems.

The stations, land grant universities, and HBCUs began doing face-to-face outreach to farmers via extension agents. 1914's Smith-Lever Act established the system of extension services.



# From “Corn Clubs” to 4-H

At the turn of the century, local corn clubs and canning clubs taught kids scientific principles for food growing and handling, offering prizes. These programs became 4-H, which was an extension service activity.

“The farmers are reached through their children, and the interest thus aroused will be handed to their children’s children.”—Dick Crosby, USDA, 1905

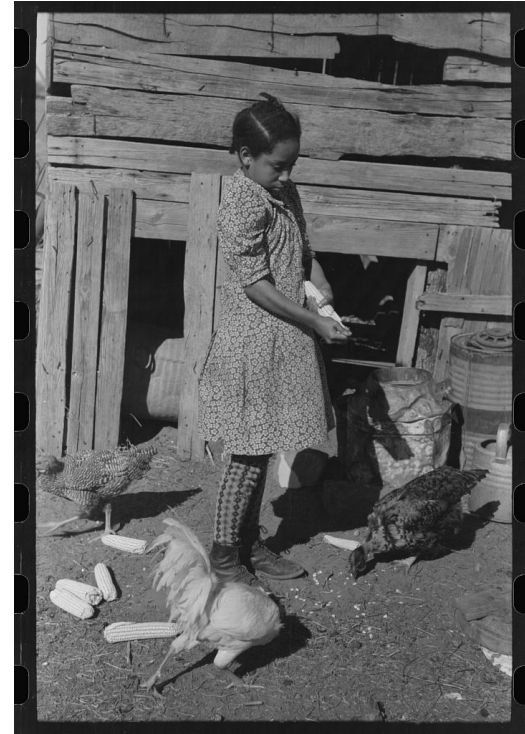


*Image: Letois Wickes Hine (Library of Congress)*

# Teaching citizens of the future to collect and use data

This model committed significant resources not only to research, but directly to community problem solving and outreach, to knowledge generation and dissemination—some of it with children.

Is today's scientific enterprise investing adequately in social transformation to build a “central ecosystem that can support continual outward growth” for the future?



*Image: Russell Lee (Library of Congress)*

Question 2:

Are we doing science right?

# Concerns that are usually considered separately

Research novelty

Reproducibility

Interdisciplinary research

Translation

Diversity and inclusion in STEMM

Sexual harassment/Bullying

Mentorship

Workforce preparation

# Reconsidering the “hero model” of academic science

A need to shift from “big people” to big questions.

Reorienting our focus from the hero model’s “big people” to the consideration of big questions will address many of the challenges plaguing universities today: incremental, derivative, low-risk science; faltering funding; relentless focus on quantity of publication; irreproducible research; ongoing complaints of harassment; lack of diversity; an atmosphere that leaves students struggling with mental health; and (despite enormous funding outlays) an inadequately trained workforce in the STEM fields of science, technology, engineering, and math.

—Lindy Elkins-Tanton



*Image: Shonagh Rae*

Question 3:

What are we missing?

## An S&T wishlist

Opportunities for everyone to learn wherever they are

Involve more people in defining questions for research

Use AI to learn what you want, when you want

Easily consult with experts

Collectively generate local knowledge

Structure knowledge for decisionmaking

Monitor effects of climate change at every level

Use social media to strengthen community rather than alienating each other

# What's that thing in the mud?

This wishlist might seem pie-in-the-sky, but all of these goals can be accomplished with a single app: iNaturalist.


In my Maine town, we need to understand the spread of invasive species, get local data for decisionmaking, and monitor our ecosystem's response to the changing climate.

When I saw this in the mud, I needed to know whether it was an invasive species.







# iNaturalist: accessible AI and expertise on my phone



WE'RE PRETTY SURE THIS IS IN THE GENUS ARENICOLA.

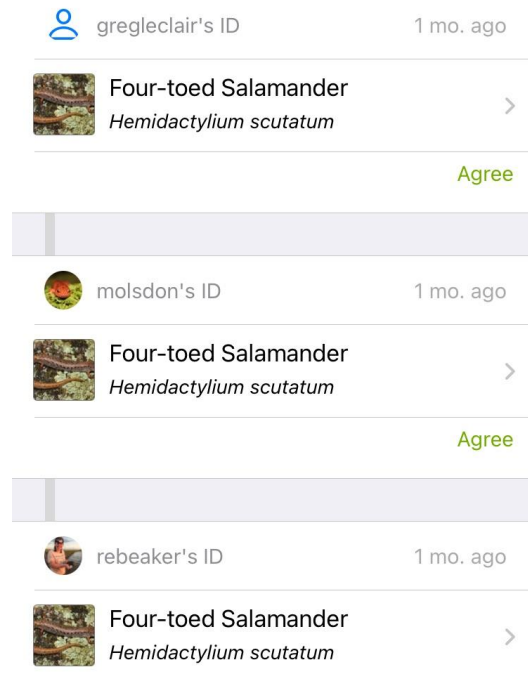


*Genus Arenicola*



Suggestions based on observations and identifications provided by the iNaturalist community, including Javier, Arnim Littek, sylb, and many others.

Instant AI identification



gregleclair's ID 1 mo. ago

Four-toed Salamander  
*Hemidactylum scutatum*

Agree

---

molsdon's ID 1 mo. ago

Four-toed Salamander  
*Hemidactylum scutatum*

Agree

---

rebeaker's ID 1 mo. ago

Four-toed Salamander  
*Hemidactylum scutatum*

Experts confirm identification

# Reimagining “citizen science” as scientific citizens

As the goals of the scientific enterprise shift towards regional development, science’s role in civil society is changing.

Leveraging older models, the science enterprise can seize new opportunities and technological tools to partner with and empower everyone to participate in creating and using knowledge in different ways.

Shifting perspective towards scientific citizens also can reveal new approaches: Finland has found that an effective way to counter misinformation is to teach kindergarteners to “think like scientists” when they hear new information. The curriculum continues through high school.

## Further Reading

Wang, Grace J. “Revisiting the Connection Between Innovation, Education, and Regional Economic Growth.” *Issues in Science and Technology* 40, no. 2 (Winter 2024): 37–42.

<https://doi.org/10.58875/NIPB7133>

Greenlee, Cynthia R. “Reinventing the Peach, the Pimento, and Regional Identity.” *Issues in Science and Technology* 38, no. 4 (Summer 2022): 75–83.

<https://issues.org/reinventing-peach-pimento-regional-identity-georgia-greenlee/>

Elkins-Tanton, Lindy. “Time to Say Goodbye to Our Heroes?” *Issues in Science and Technology* 37, no. 4 (Summer 2021): 34–40. <https://issues.org/say-goodbye-hero-model-science-elkins-tanton/>

Margonelli, Lisa. “Mud, Muddling, and Science Policy.” *Issues in Science and Technology* 40, no. 3 (Spring 2024): 17–19. <https://doi.org/10.58875/TEDW8951>

Kivinen, Kari. “In Finland, We Make Each Schoolchild a Scientist.” *Issues in Science and Technology* 39, no. 3 (Spring 2023): 41–42. <https://doi.org/10.58875/FEXX4401>