

Tech Talk

Unlock Actionable Insights with User-Focused Data Visualization Solutions

JULY 17, 2024

Janell Kochevar, UXC

Lisa Lines, PhD, MPH

Patrick Brown, MS

David Birchfield, PhD, MA

Darigg Brown, PhD, MPH





Webinar Overview

The importance of user-centered design in promoting data accessibility and usability among target audiences

How fit-for-purpose visualization solutions can make complex data more actionable

Processes for applying user-centered design principles across a variety of digital data solutions to quickly produce valuable insights



Today's Presenters



Lisa Lines

Senior Health Services
Researcher
RTI International



Patrick Brown

Technical Director
RTI International



David Birchfield

Senior Director
RTI International



Darigg Brown

Program Manager
RTI International

CASE STUDY

The RTI Rarity™ Project





Award-Winning RTI Solution

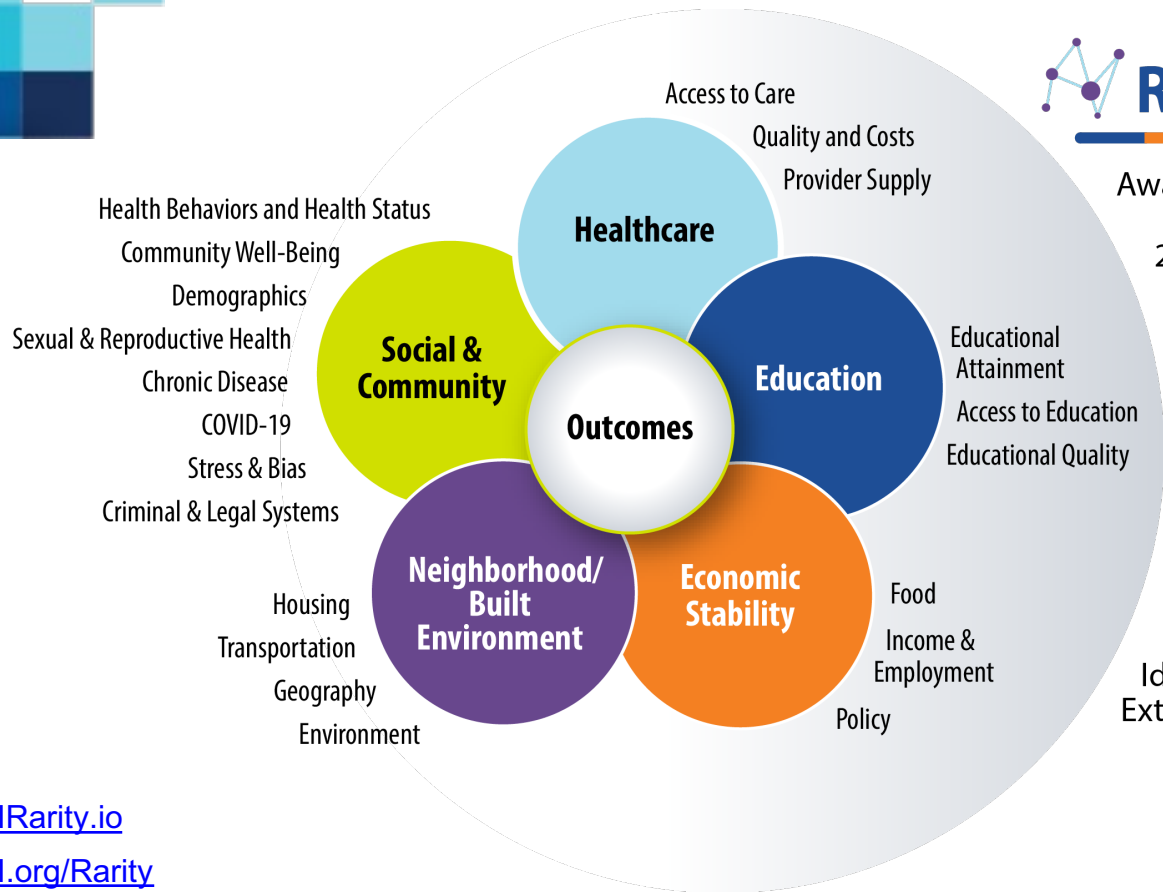
200+ Measures in 16 Domains

Research-Ready, Validated Data Library

Improve Health Equity through Targeted Interventions

Understand and Account for SDOH and Other Community Context

Identify Communities in Need of Extra Resources



 RTIRarity.io

 RTI.org/Rarity

Internal Query Engine

Filter

Classification ▲

COVID Community

Composite

Demographics Education

Environment Food

Geography Healthcare

Housing Illness

Justice Policy

Poverty SRH Stress

Transportation Wellbeing

Data Resolution ▲


County Tract ZCTA


State Availability ▲


Nationwide ▼


Data Contributors ▲


RTI GeoMetrix

 **4-year HS graduation rate**
Years: 2011 - 2018
Contributor: RTI Rarity
Source: Robert Wood Johnson Foundation (RWJF) County Health Rankings

 **ACSC hospitalization rate**
Years: 2010
Contributor: RTI Rarity
Source: Robert Wood Johnson Foundation (RWJF) County Health Rankings

 **ADI Percentile**
Years: 2019
Contributor: RTI Rarity
Source: Neighborhood Atlas

 **Adult incarceration rate**
Years: 2010
Contributor: RTI Rarity
Source: Prison Policy Institute (PPI)

 **AIAN, non-Hispanic**
Years: 2014 - 2019
Contributor: RTI Rarity
Source: American Community Survey (ACS) 5-year Estimates

183 variables in your current filter settings



How We Create Local Social Inequity Scores



Conceptual
model



Data
curation



Random forests,
XGBoost, etc.

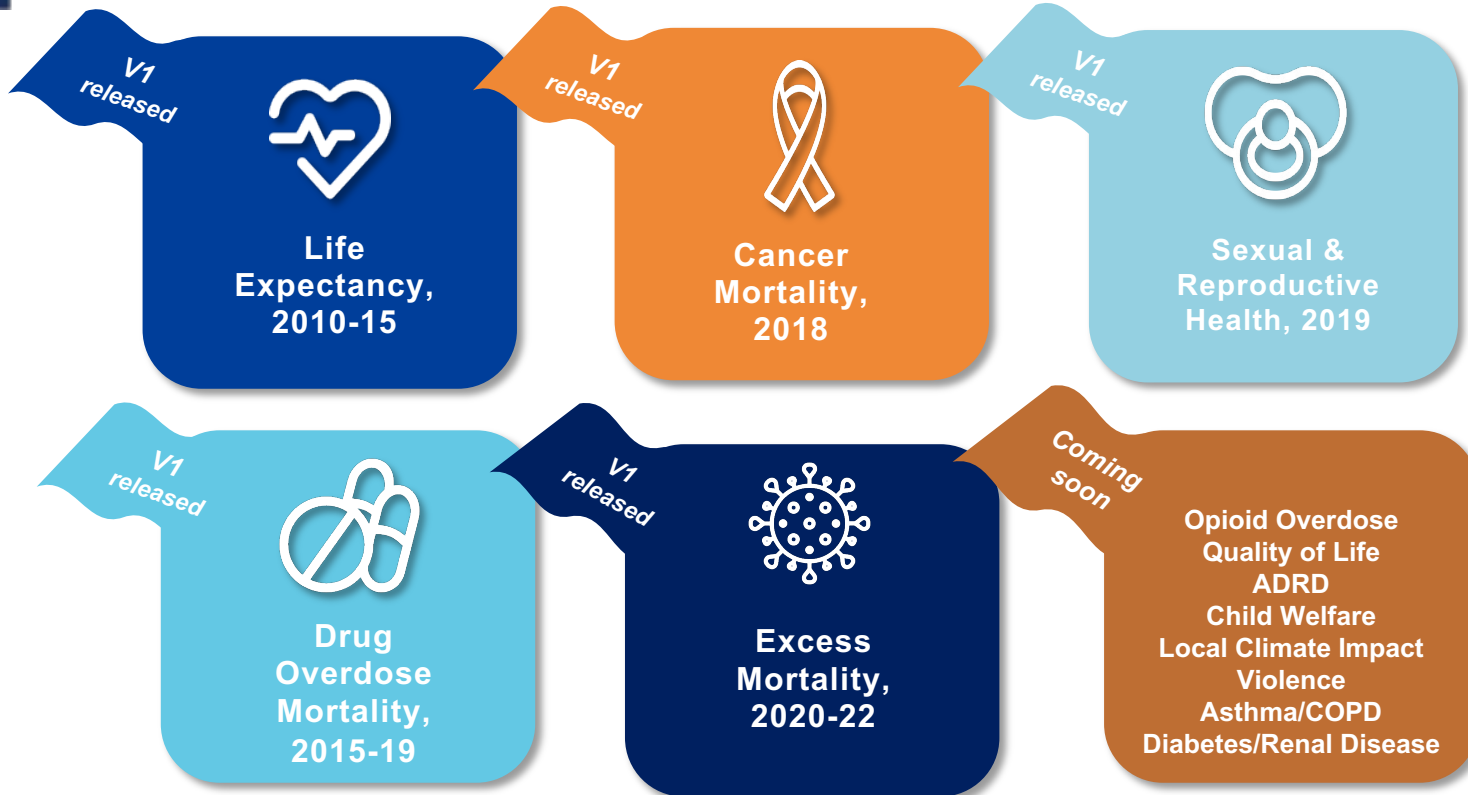


Ranked
percentile scores



Validation

Local Social Inequity Scores

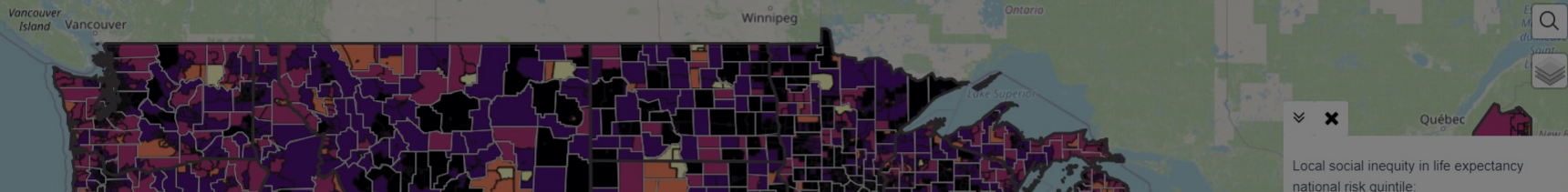


Validation

Variance Explained (Adjusted R²)

	Life Expectancy (2010-15)	Cancer Mortality (2018)	ADRD Prevalence (2018)	Drug Overdose Mortality (2015-19)	Sexual & Reproductive Health (2019)	Quality of Life (2021)	Excess Mortality (2020-22)
ADI	29.0%	31.0%	1.1%	7.0%	21.0%	44.7%	6.5%
SDI	34.0%	2.0%	2.6%	2.0%	23.0%	54.0%	2.8%
SVI	30.0%	2.0%	1.7%	2.0%	19.0%	63.4%	3.3%
LSI	70.0%	98.0%	99.5%	99.0%	81.0%	98.4%	98.2%





RTI Rarity™

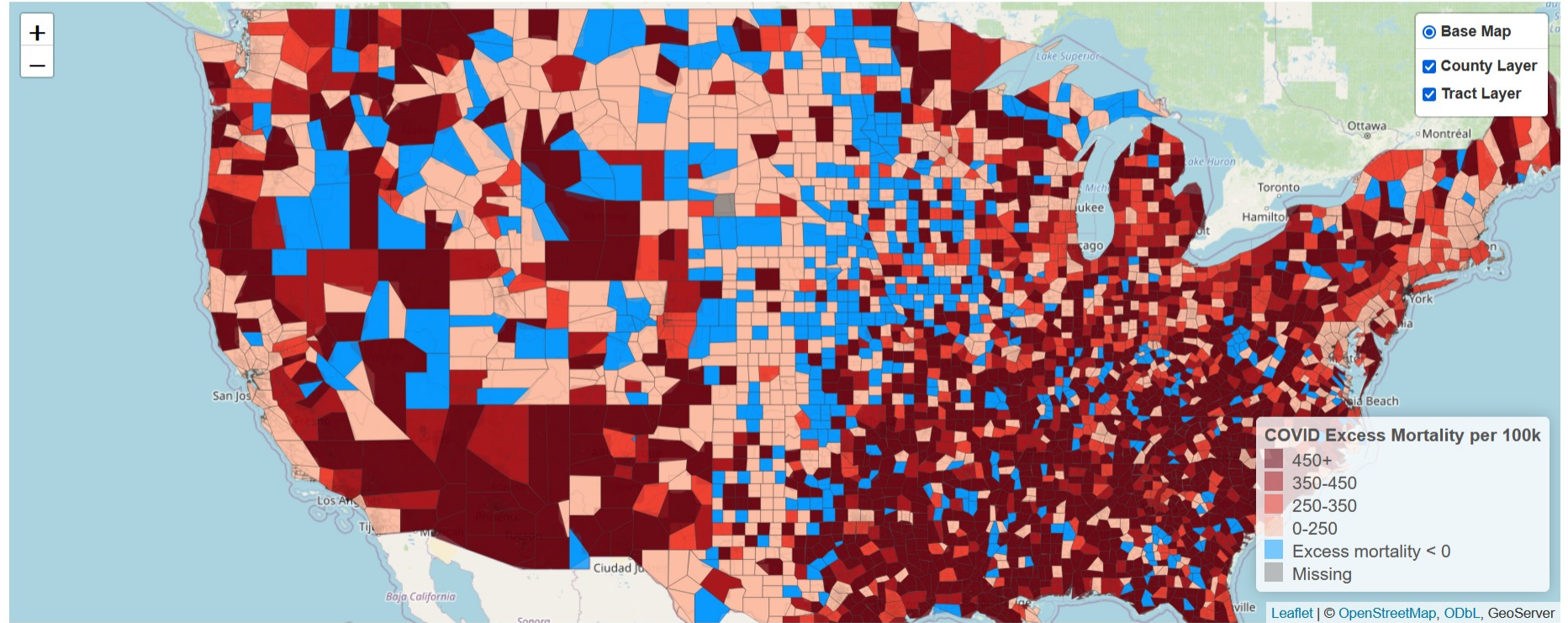
Where are the biggest local social inequities in health outcomes across the US?

The RTI Rarity dashboard answers this question using data science and machine learning to analyze a vast data library of more than 200 measures in multiple domains of social, and behavioral determinants of health. Use this tool to explore your own community's risk for inequities in life expectancy, cancer mortality, drug overdoses, and more. See where the resources are relative to the areas with the greatest need.

[Begin Exploring](#)



Cumulative Excess Mortality Rate per 100k Residents, 2020-2022



CASE STUDY

U.S. Department of Education College Scorecard



Project Background

Flagship product from the Department of Education Office of Planning, Evaluation and Policy Development (OPEPD)

Under iterative development since 2015

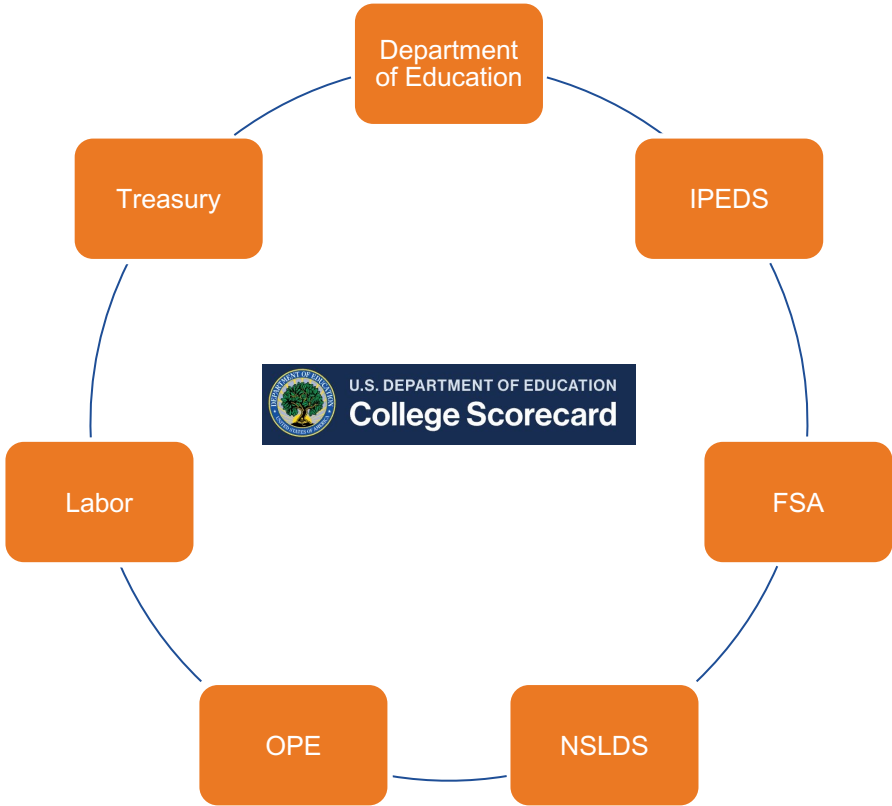
Receives ~100K visitors per month
* more traffic during college application times

A free public resource

 <http://collegescorecard.ed.gov>



Data Sources





Scorecard Application

Data / API

1996 to 2023

3,305 Institution-level Variables

174 Field of Study Variables

35 CSV files, 390MB

Limited to individuals who received
Student Aid

Consumer Website

Search, Filter, and Sorting

Institution Profiles

Fields of Study

Comparison Tool

Data Visualizations

Data Downloads



User Testing

You've built it,
but will they come?

Moderated vs.
Unmoderated

User Personas

Populations

High school
students seeking
a 2- or 4- year
degree

Community
College transfer
students

Adults going
back to school

Veterans

Students seeking
certificates

Traditionally
underrepresented
populations

Parents

School
counselors

Media

Example Persona: High School Counselor



"I want to support all my students in choosing their next steps after high school."

Attitude:

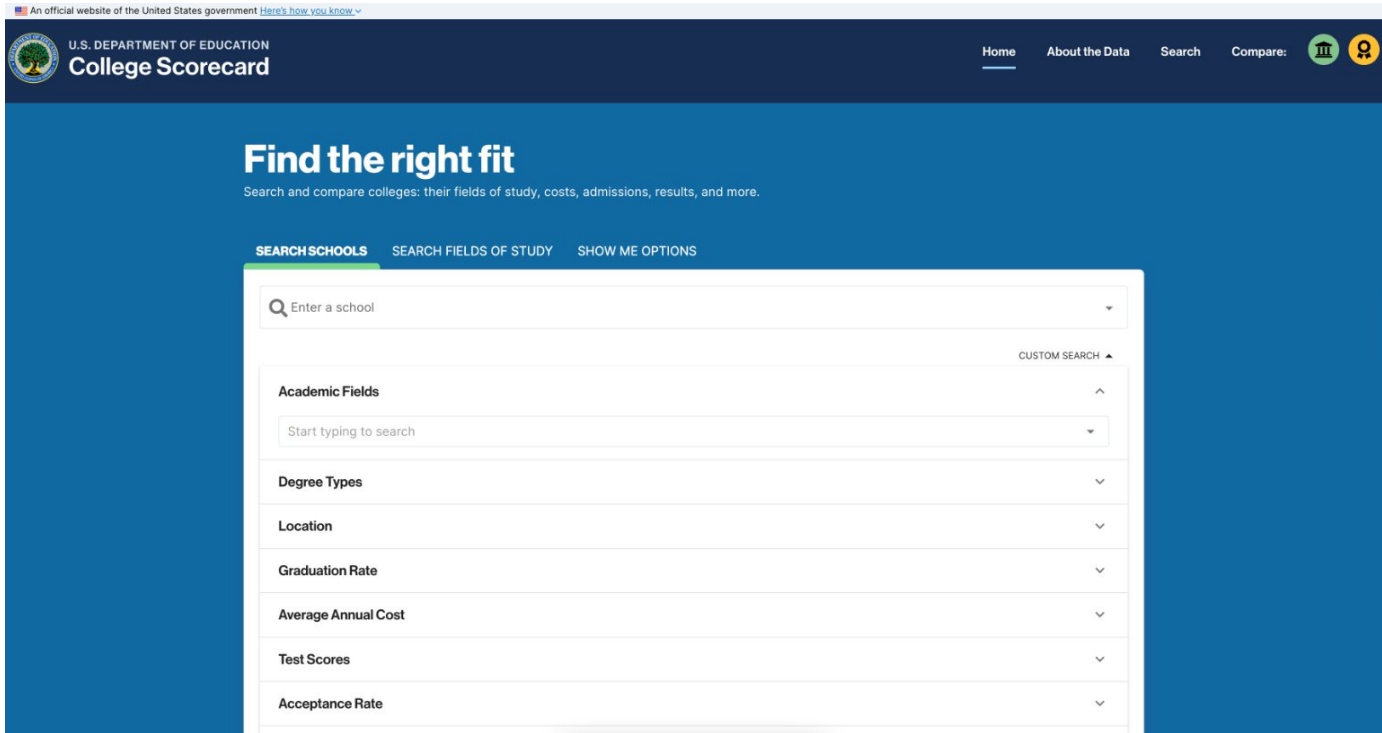
- I'm here to help students understand the college application process and help them consider all relevant factors when making a decision about where to attend.
- I have to support students from all different backgrounds pursuing all different types of higher education.

Goal: Support high school students find the right higher education option for them.

General Description:



- High school counselor serving upwards of 200 students in one school
- Helps guide students in the process for preparing and applying to college.
- For college, high school counselors guide students to apply for schools that are the best fit for their students. Factors they may consider include:
 - ✓ Type of degrees offered
 - ✓ Academic programs offered
 - ✓ Price/aid offers
 - ✓ Location
 - ✓ Entry requirements

Search Options



An official website of the United States government [Here's how you know](#)

U.S. DEPARTMENT OF EDUCATION
College Scorecard

Home About the Data Search Compare:  

Find the right fit

Search and compare colleges: their fields of study, costs, admissions, results, and more.

SEARCH SCHOOLS SEARCH FIELDS OF STUDY SHOW ME OPTIONS

Q Enter a school



CUSTOM SEARCH ▲

- Academic Fields ▲
- Start typing to search
- Degree Types ▼
- Location ▼
- Graduation Rate ▼
- Average Annual Cost ▼
- Test Scores ▼
- Acceptance Rate ▼

Institution Profile

An official website of the United States government [Here's how you know.](#)





U.S. DEPARTMENT OF EDUCATION
College Scorecard

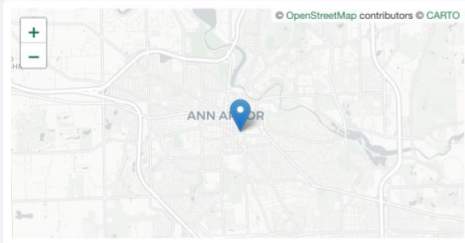
Home About the Data Search Compare:  

[← Back](#) [Add to Compare School](#) [Share this School](#)

University of Michigan-Ann Arbor

32,448 undergraduate students
umich.edu

 Year  Public  City  Large



Ann Arbor, MI 48109 [View on map](#)

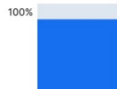
Midpoint for 4-yr Schools

Midpoint for All Schools

Graduation Rate [®]

94%

Midpoint for 4-yr Schools: 58%



Average Annual Cost [®]

\$16,792



Midpoint for 4-yr Schools: \$19,555



Compare Institutions and Fields of Study

An official website of the United States government [Here's how you know](#)



U.S. DEPARTMENT OF EDUCATION
College Scorecard

Home About the Data Search **Compare:**  

« Back [Share this Comparison](#)

Compare Schools and Fields of Study

SCHOOLS (2) **FIELDS OF STUDY (0)**

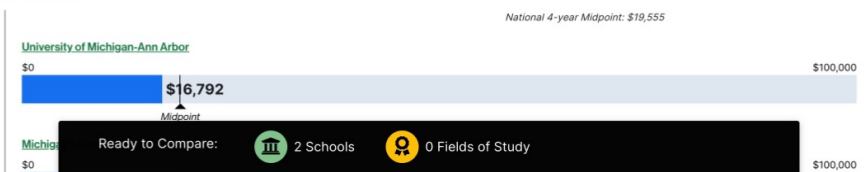
University of Michigan-Ann Arbor  Michigan State University 

Midpoint for School Type Midpoint for All Schools



Average Annual Cost [®]

Cost includes tuition, living costs, books and supplies, and fees minus the average grants and scholarships for federal financial aid recipients.

4-YEAR SCHOOLS National 4-year Midpoint: \$19,555

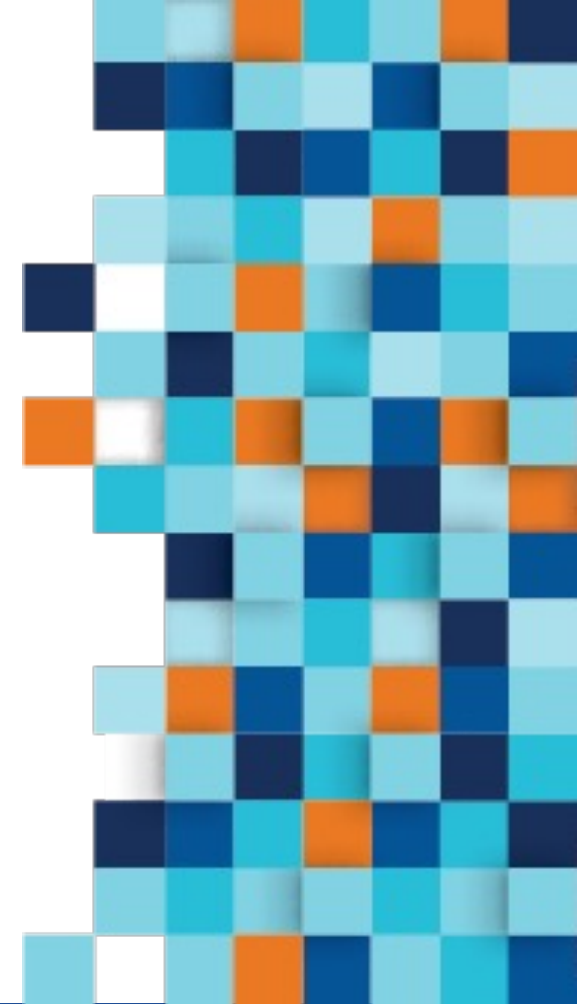


School	Average Annual Cost
University of Michigan-Ann Arbor	\$16,792
National 4-year Midpoint	\$19,555

Ready to Compare:  2 Schools  0 Fields of Study

CASE STUDY

NSF Research Community Dashboard



Project Goal



The Research Community Dashboard, sponsored by NSF Evaluation and Assessment Capability (EAC), provides internal staff visualizations and interactive tools to better understand underrepresented groups (people and institutions) in NSF's portfolio of investments.

* Note all data displayed in these slides is simulated for presentation purposes only. Access is restricted to internal NSF users.





Human-Centered Design | NSF Personas



Adesh
The Strategist



Caleb
The Architect



Devon
The Communicator



Elizabeth
The Analyst



Dashboard Goals



Support strategic leaders with a range of innovative visualizations and interactive tools to advance understanding to broaden participation



Enable deep-dive questions and investigations



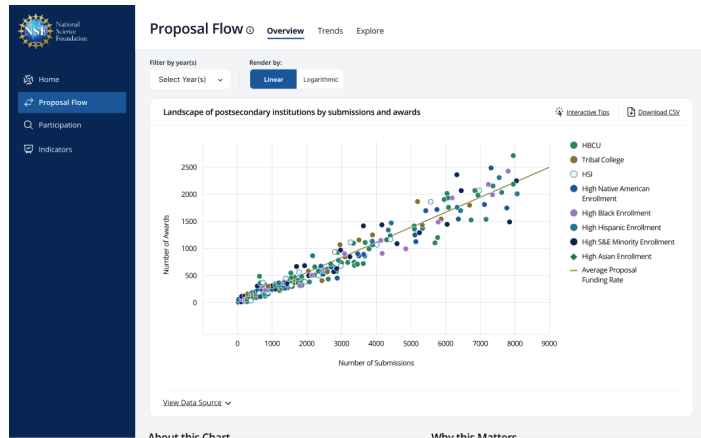
Integrate external benchmark data across the NSF portfolio



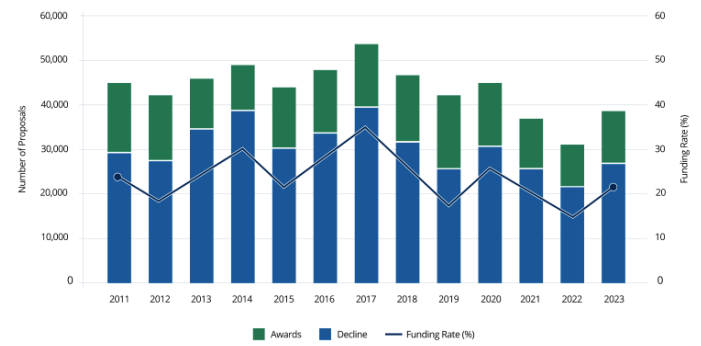
Proposal Flow

How is funding flowing from proposals to awards across PIs, institutions, and regions?

Overview

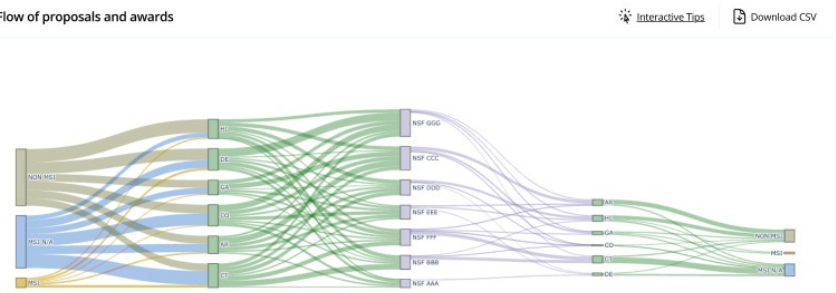


Trends



Explore

Flow of proposals and awards



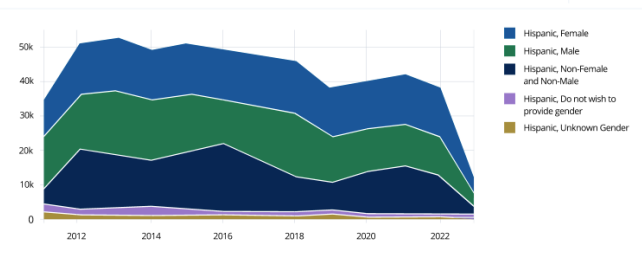
* Chart data is simulated for presentation purposes only.

Participation

What are the participation patterns and where are the opportunities to engage PIs and Institutions?

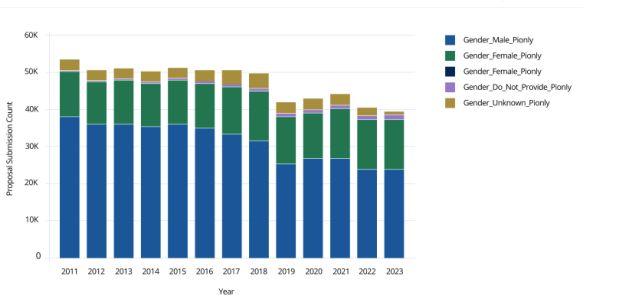
Trends

Intersectional characteristics of PIs and Co-PIs

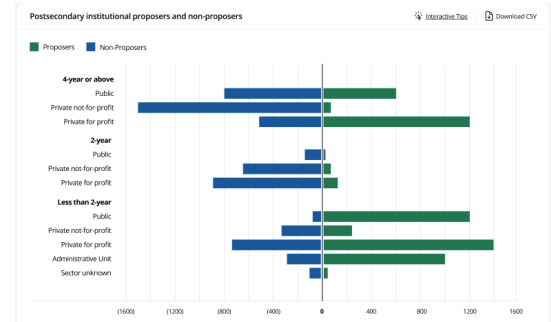


[View Data Source](#)

Proposal Submission Counts by PI Characteristic

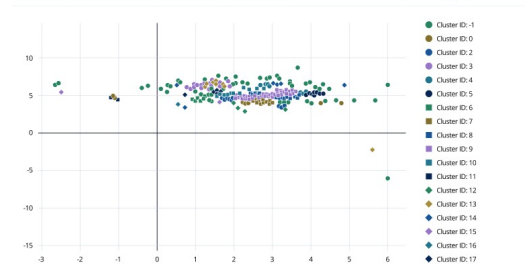


Overview



Explore

Landscape of postsecondary institutions by proposal submission behaviors

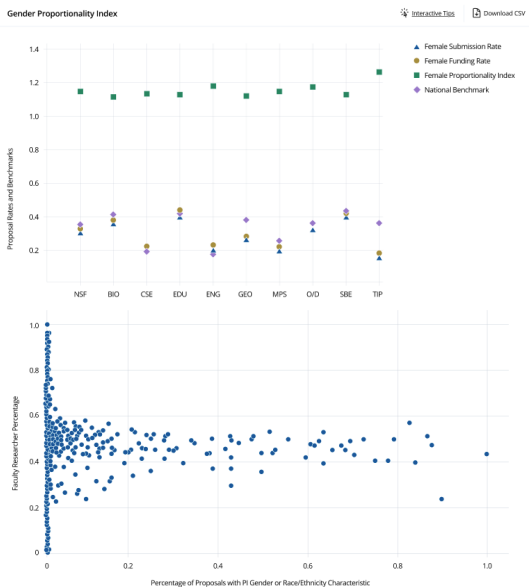


* Chart data is simulated for presentation purposes only.

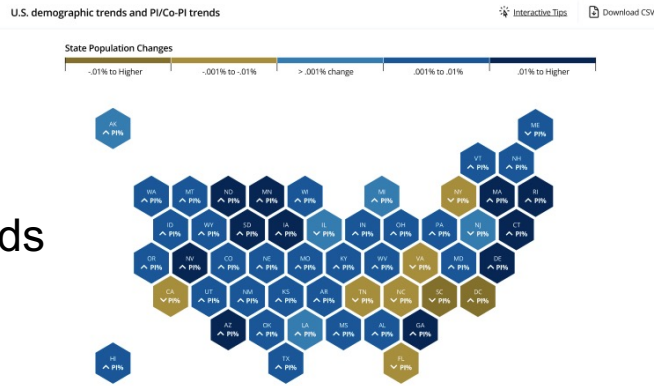
Indicators

What are the factors and benchmarks that reveal NSF submission and funding patterns from an equity perspective?

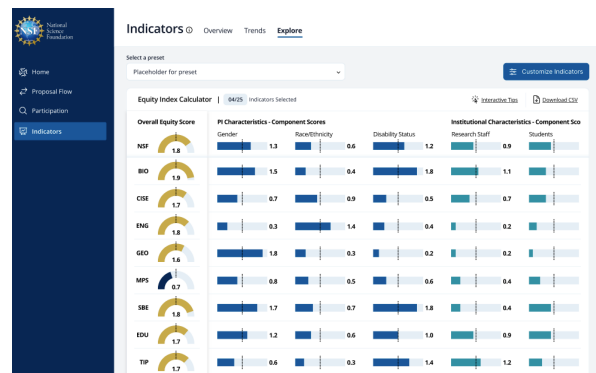
Overview



Trends



Explore



* Chart data is simulated for presentation purposes only.


Why visit the NSF Research Community Dashboard?


Engage Key and Emerging Topics for the NSF

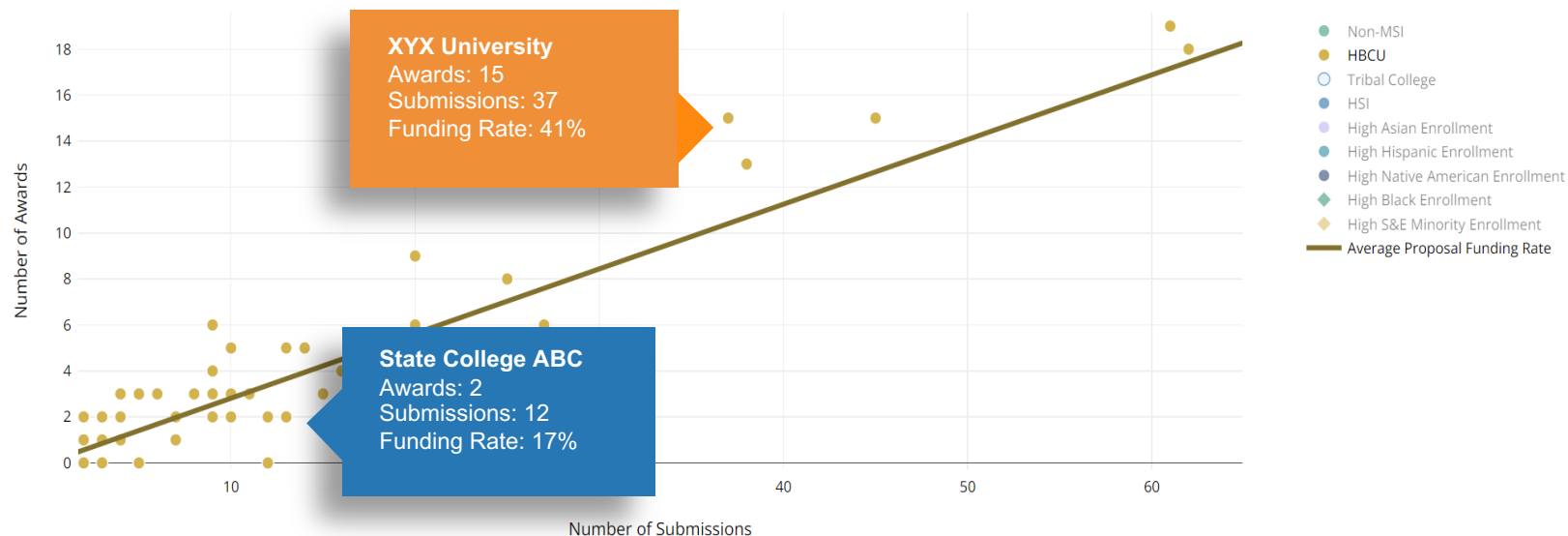


Analyze Outliers

Landscape of Post-Secondary Institutions by Submissions and Awards

 Interactive Tips

 Download CSV



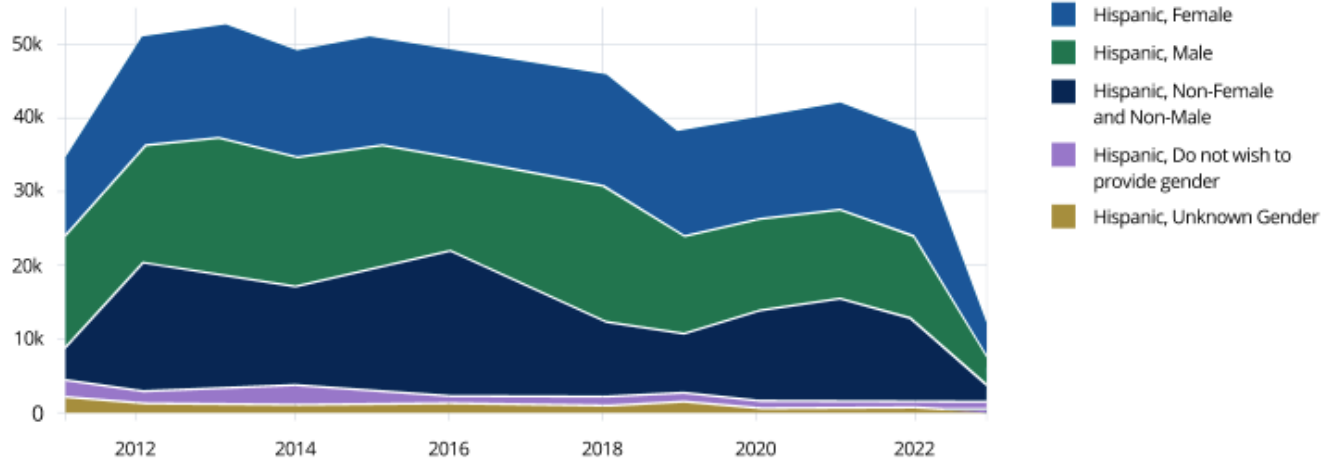
* Chart data is simulated for presentation purposes only.

Examine Intersectionality

Intersectional characteristics of PIs and Co-PIs

[Interactive Tips](#)

[Download CSV](#)



[View Data Source](#) ▾

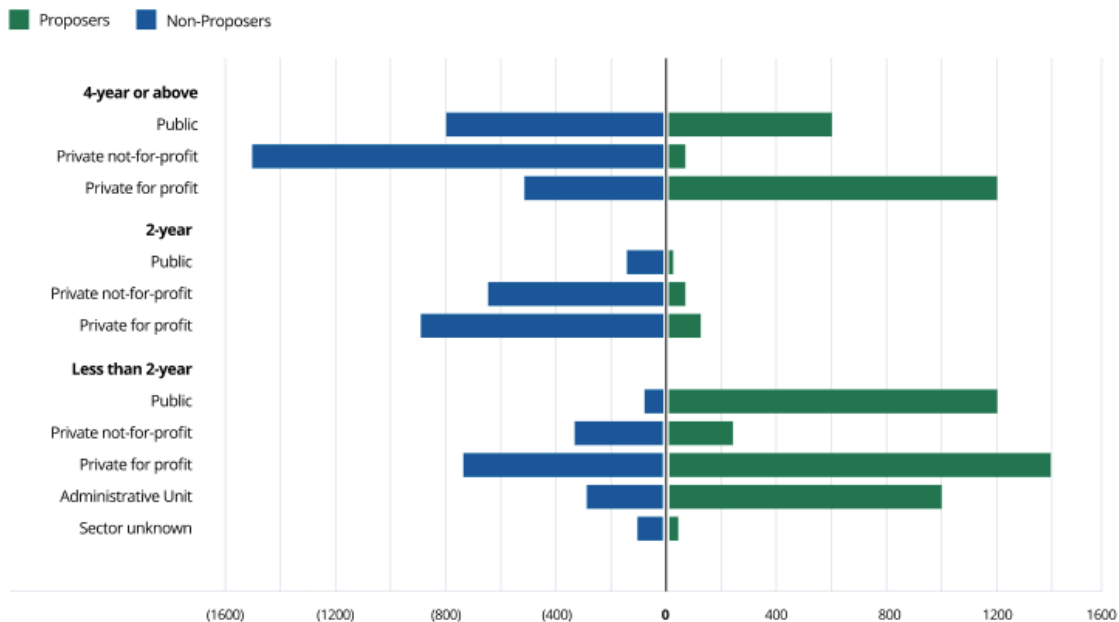
* Chart data is simulated for presentation purposes only.

Identify Gaps & Opportunities

Postsecondary institutional proposers and non-proposers

 [Interactive Tips](#)

 [Download CSV](#)



* Chart data is simulated for presentation purposes only.

Assess NSF Trends in National Context

U.S. demographic trends and PI/Co-PI trends

[Interactive Tips](#)

[Download CSV](#)

State Population Changes



Identify states that are trending in the SAME direction or OPPOSITE directions



Maine
US Census Change: +1%
NSF PI Change: -1%



* Chart data is simulated for presentation purposes only.

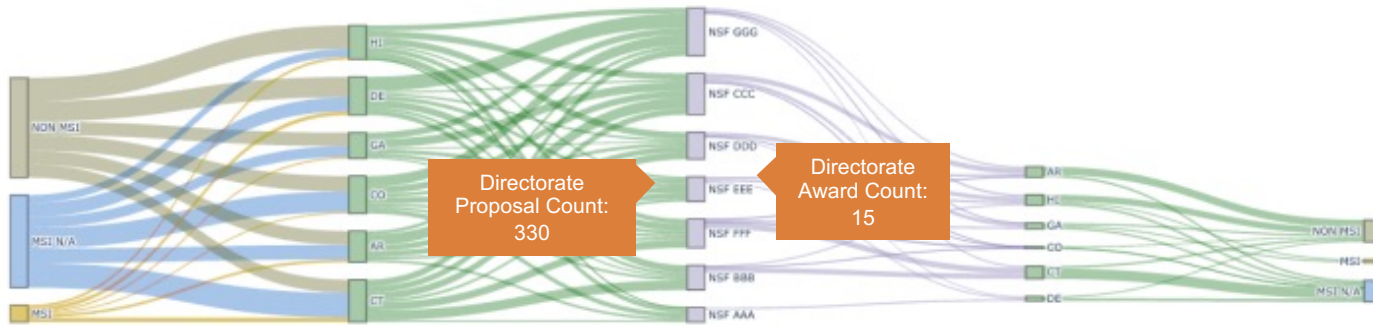
Explore Other Emerging Topics

Proposals and Awards from Rural Locales

Flow of proposals and awards

 [Interactive Tips](#)

 [Download CSV](#)



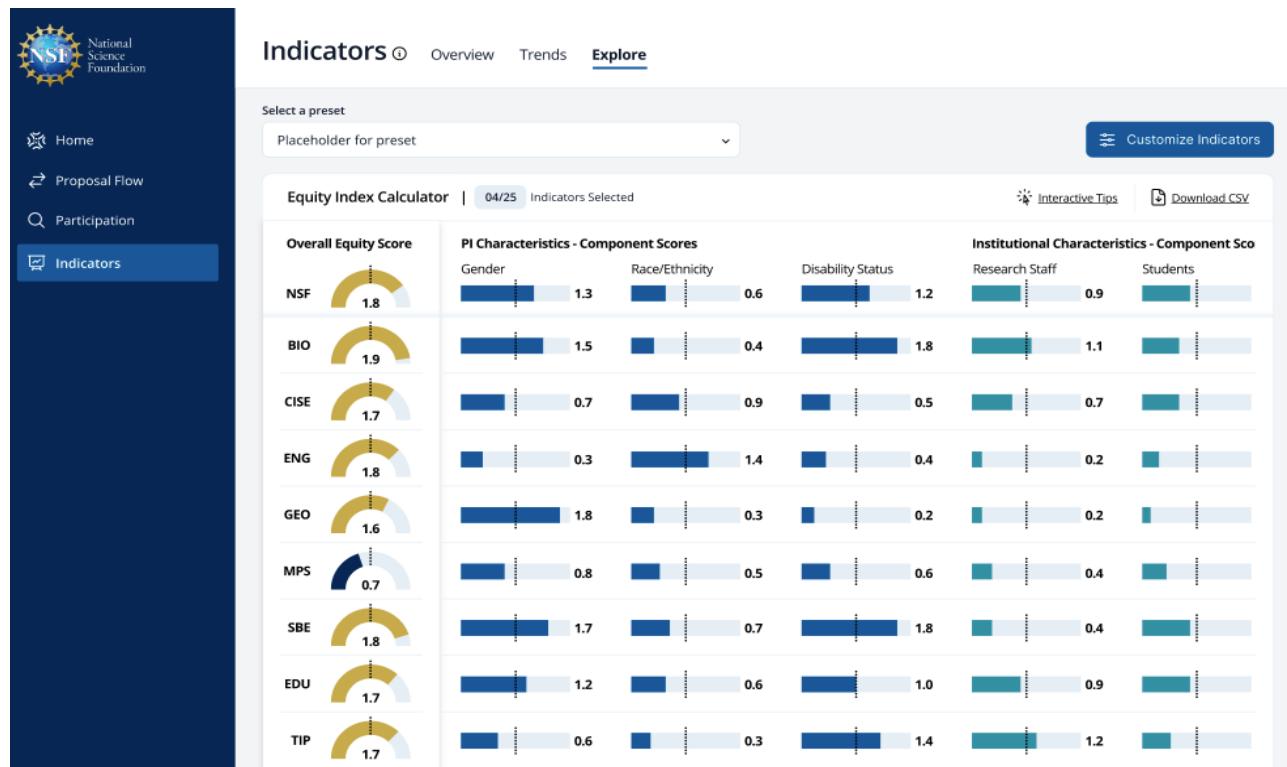
* Chart data is simulated for presentation purposes only.

NSF Access Indicators Framework

Over 40 demographic, institutional, and geographic indicators of diversity

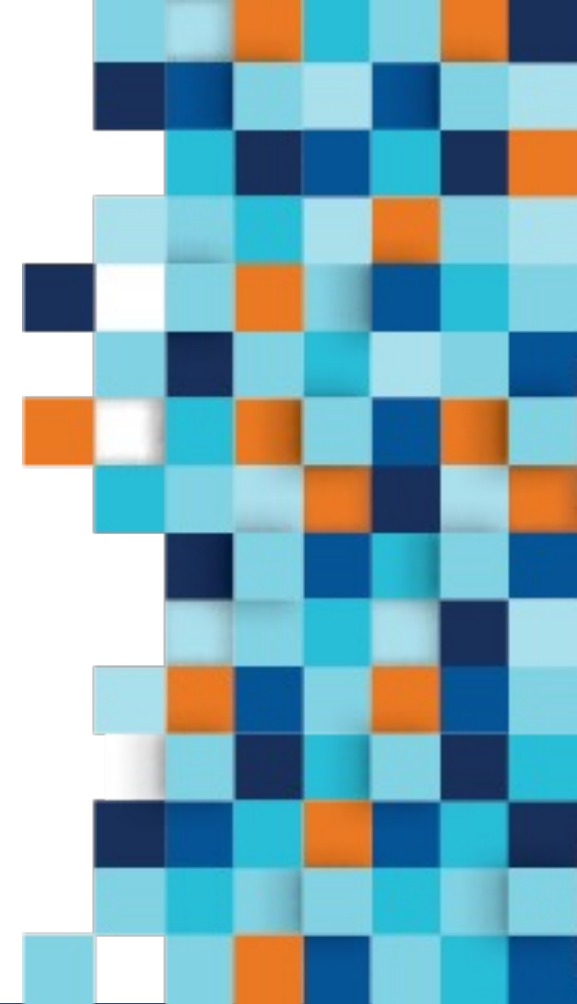
User can select relevant indicators for customized reports

* Chart data is simulated for presentation purposes only.

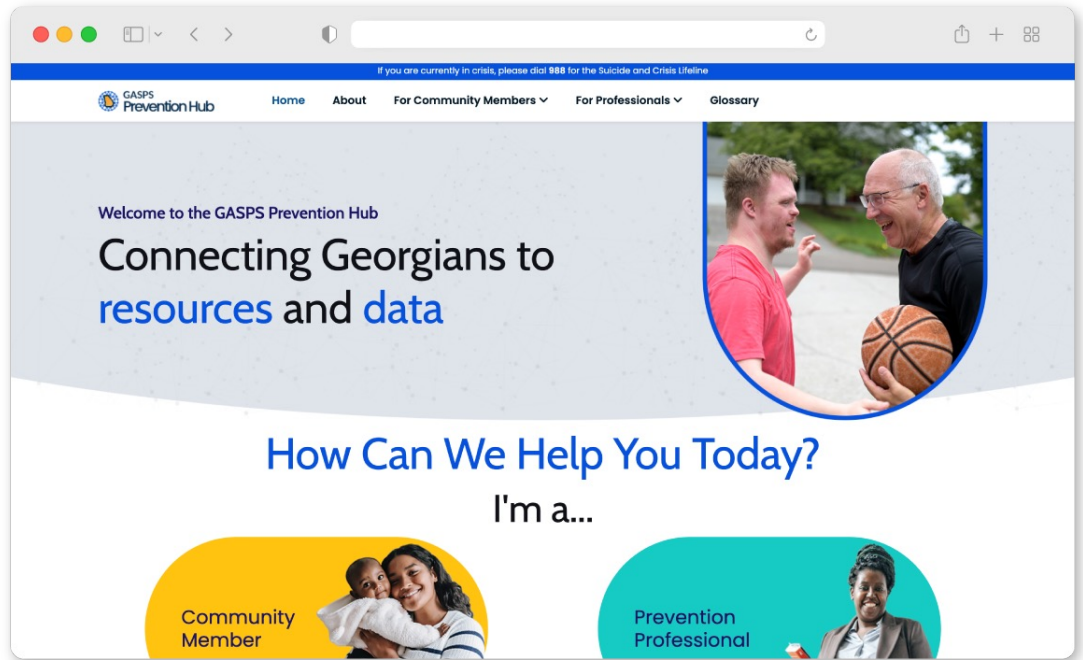


CASE STUDY

The Georgia Prevention Data Hub



What is the Georgia Prevention Data Hub?



<http://gapreventionhub.org>

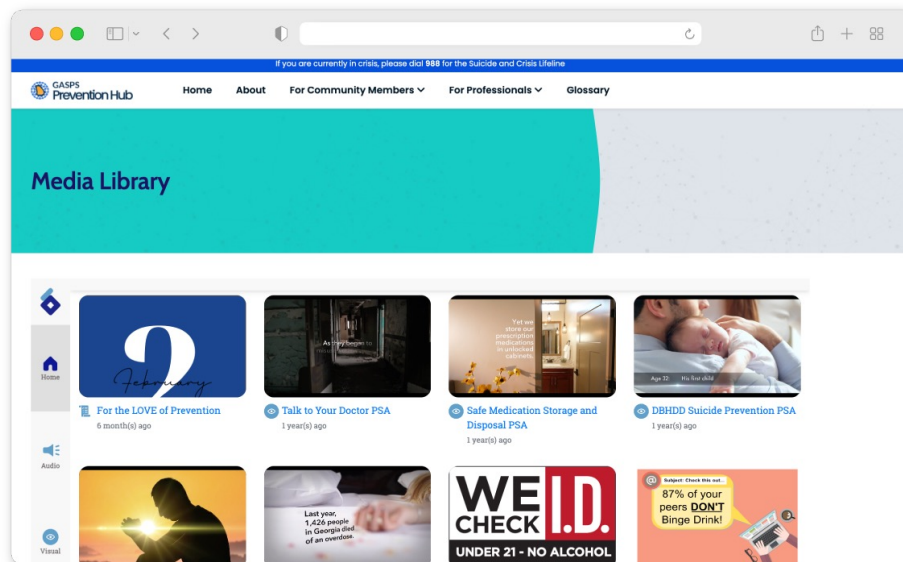
Prevention Hub: A Centralized System

Custom Prevention
Hub website:

<https://gapreventionhub.org>

Content

- Training
- Media
- Services
- **Data Warehouse**



<http://gapreventionhub.org>



Gathering and Synthesizing Data



Created a foundation from which stories can be unearthed



Built framework for identifying data sources and materials



Identified data gaps



Employed strategies for collecting, organizing, processing, storing, and synthesizing datasets

Data Warehouse: A Centralized Source

Custom data warehouse
website: <http://www.gaspsdata.net/>

Content

- Reports
- Fact Sheets
- Maps
- Publications
- **Interactive Dashboards**

The screenshot shows the GASPS Data Warehouse website. At the top, there is a navigation bar with the Georgia Department of Behavioral Health & Developmental Disabilities logo, a search bar, and links for Help, Contact, and Definitions. Below the navigation bar, the main header includes the GASPS Data Warehouse logo and a 'GET DATA' button. A central banner features a 'NEW DIGITIZED DATA INVENTORY' announcement. To the right, a 'Find Data' sidebar contains dropdown menus for Data Category, Data Type, and Tags, along with a 'GET DATA' button. Below the banner, a 'New Content' section displays four featured items, each with a document icon, a date range, and a title: Substance Abuse Prevention (Illicitly Manufactured Fentanyl-Involved Overdose Deaths with Detected Xylazine - 2019-2022), Substance Abuse Prevention (E-cigarette Unit Sales by Product and Flavor Type, and Top-Selling Brands - United States - 2020-2022), Substance Abuse Prevention, Suicide Prevention (Youth Risk Behavior Survey: Data Summary and Trends Report - 2011-2021), and Substance Abuse Prevention (Provisional Mortality Data - 2022).

<http://www.gaspsdata.net>

Goal: Make 25+ datasets available to public

Public data can be difficult

- to find
- to use
- to make compare

Curating data can be time consuming

- Every dataset is unique

Goal: Create a process to efficiently collect, visualize and share these datasets



Advantages of Using Tableau for Data Visualization

User-friendly interface

Interactive visualizations

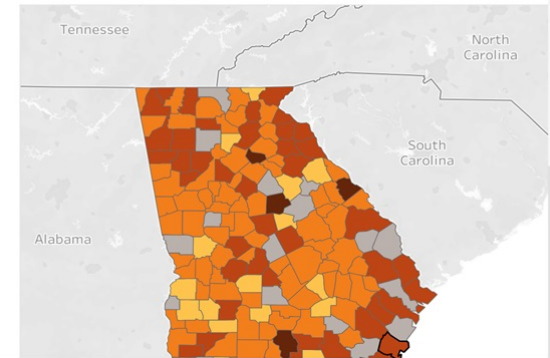
- Mouse over to show additional information

No coding required

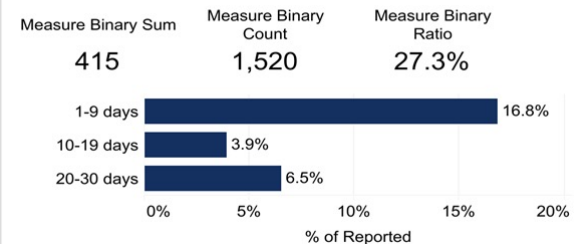
Easily embed dashboard on a website

Attractive standard visualization options

<http://www.gaspsdata.net/data/georgia-student-health-survey>



Georgia (Glynn County) (2022)
27.3% reported Difficulty Concentrating in Past 30 Days





Limitations and Challenges of Tableau

Tableau Public

- Free, public dashboard hosting
- Data publicly accessible



Tableau Cloud

- Private dashboard hosting & collaboration
- Data security
- Expensive



Learning curve

Limited to visualization types available in Tableau



Using the Data Visualization Tool

Anticipated Users

- Prevention Practitioners
- Researchers in Various Domains
- Public Health Professionals
- Board of Education Members
- Medical Professionals
- Elected Officials
- Parents & Community Members

Potential Use Cases

- Understand populations & the challenges they face
- Influence research, healthcare, public policy, educational policies



Using the Data Visualization Tool

Indicators

- Substance Abuse
- Mental Health
- Suicide

Geographies

- County
- Regional
- State
- National

Demographics

- Age
- Grade Level
- Race
- Ethnicity
- Gender

Time Scale

- Single Year
- Multi-Year

Displaying 1 - 20 of 36

NEW DIGITIZED DATA INVENTORY

Explore our data inventory on the Get Sources page! This inventory was developed with input from our State Epidemiology Outcomes Workgroup members.

DATA INVENTORY

Find Data

Data Category

Substance Abuse Prevention ▾

Data Type

Interactive Dashboard ▾

Tags

opioids ▾

GET DATA

New Content

2019-2022

2020-2022

2011-2021

2022

<http://www.gaspsdata.net>

Search for keywords:

Data Category

- Mental Health Promotion
- Substance Abuse Prevention
- Suicide Prevention

Data Type

- Fact Sheet/Infographic
- Interactive Dashboard
- Maps
- Publications & Presentations
- Report
 - Annual Report
 - Assessment
 - DPH Drug Surveillance Unit Report
 - Epidemiological Profile

Displaying 1 - 6 of 6

2015-2022



Interactive Dashboard

Georgia Student Health Survey


2015-2022



Interactive Dashboard

Monitoring the Future

1979-2020



Interactive Dashboard

ONDCP Support Act Data


2015-2020



Interactive Dashboard

TEDS-A

2019-2020



Interactive Dashboard

TEDS-D

2002-2014



Interactive Dashboard

GBI Dashboard

<http://www.gaspsdata.net>

Georgia Student Health Survey

2015-2022



Georgia Student Health Survey (GSHS) 2015-2022

Single Year View

View Settings

Select School Year

2022

Filter Gender

(All)

Filter Grade

(All)

Select Measure

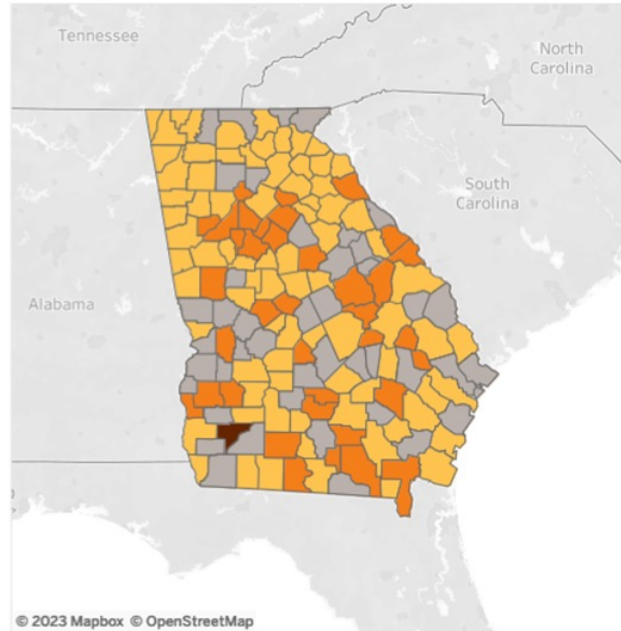
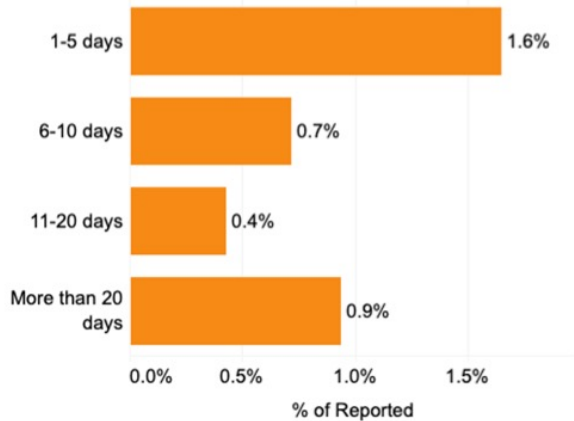
Substance Abuse: Painkillers

Number of days in the past month in which the respondent reported using prescription painkillers (e.g., Oxycontin, Vicodin) without a doctor's prescription

<http://www.gaspsdata.net/data/georgia-student-health-survey>

Reported Painkillers in Past 30 Days by Gender
 Georgia (Statewide), 2022
 Among Gender (All) and Grade (6, 7, 8 and 4 more)

Measure Binary Sum	Measure Binary Count	Measure Binary Ratio
14,452	386,703	3.7%

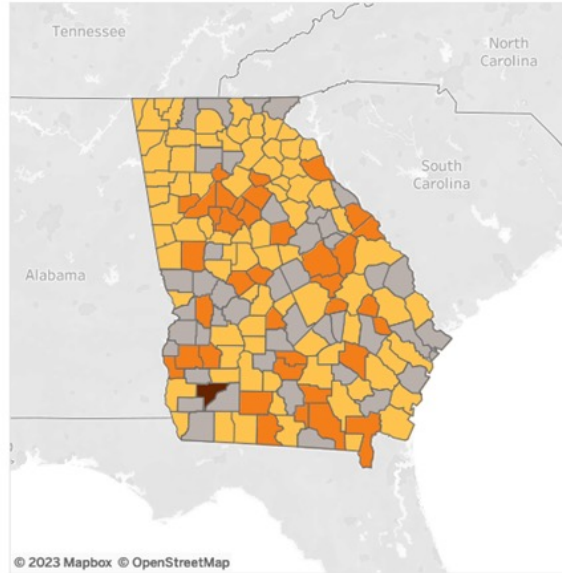
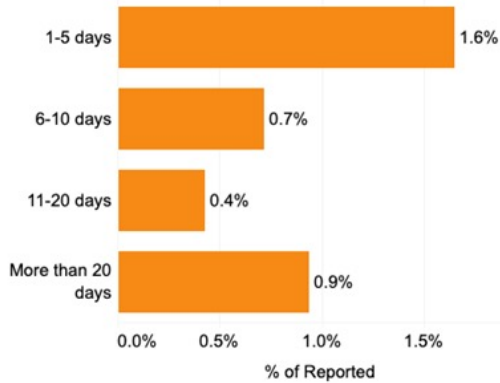


<http://www.gaspsdata.net/data/georgia-student-health-survey>

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Measure Binary Sum Measure Binary Count Measure Binary Ratio

14,452 386,703 3.7%



Measure Ratio
 1.6% 11.5%

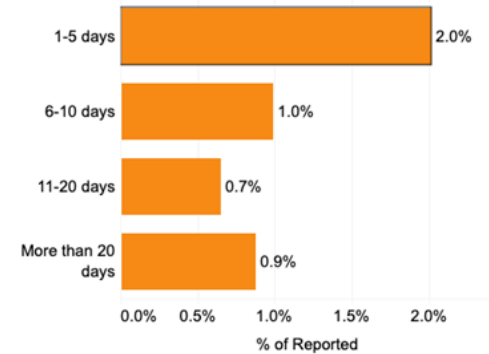
State View

Select County Name
 Fulton County

Reported Painkillers
 Georgia (Fulton County)
 Among Gender (All) and Grade (6, 7, 8 and 4 more)

Measure Binary Sum Measure Binary Count Measure Binary Ratio

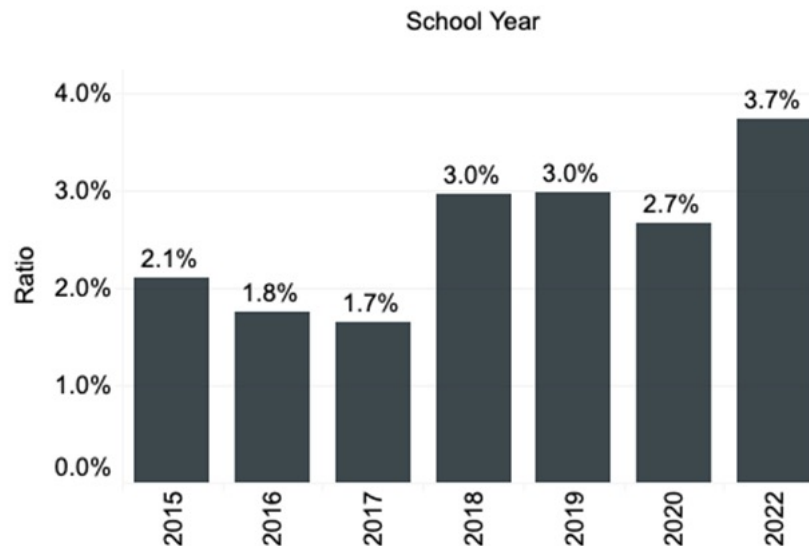
953 21,055 4.5%



<http://www.gaspsdata.net/data/georgia-student-health-survey>

Reported Painkillers in Past 30 Days, Georgia, 2015 to 2022
Among Gender (All) and Grade (6, 7, 8 and 4 more)

	Measure Binary Sum	Measure Binary Count	Measure Binary Ratio
2015	12,621	602,388	2.1%
2016	11,144	633,731	1.8%
2017	10,617	643,225	1.7%
2018	19,079	643,493	3.0%
2019	19,315	648,540	3.0%
2020	19,274	725,229	2.7%
2022	14,452	386,703	3.7%



<http://www.gaspsdata.net/data/georgia-student-health-survey>

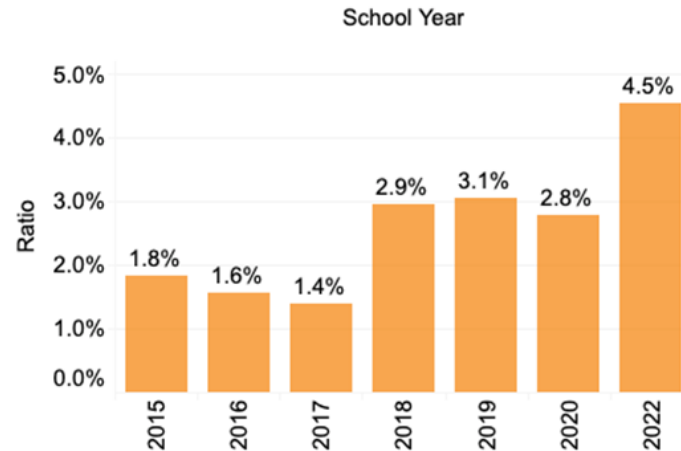
County View

Select County

Fulton County

Reported Painkillers in Past 30 Days Georgia (Fulton County), 2015 to 2022 Among Gender (All) and Grade (6, 7, 8 and 4 more)

	Measure Binary Sum	Measure Binary Count	Measure Binary Ratio
2015	880	48,182	1.8%
2016	844	53,782	1.6%
2017	805	57,952	1.4%
2018	1,648	55,997	2.9%
2019	1,732	56,665	3.1%
2020	1,649	59,469	2.8%
2022	953	21,055	4.5%



<http://www.gaspsdata.net/data/georgia-student-health-survey>

Thank You!

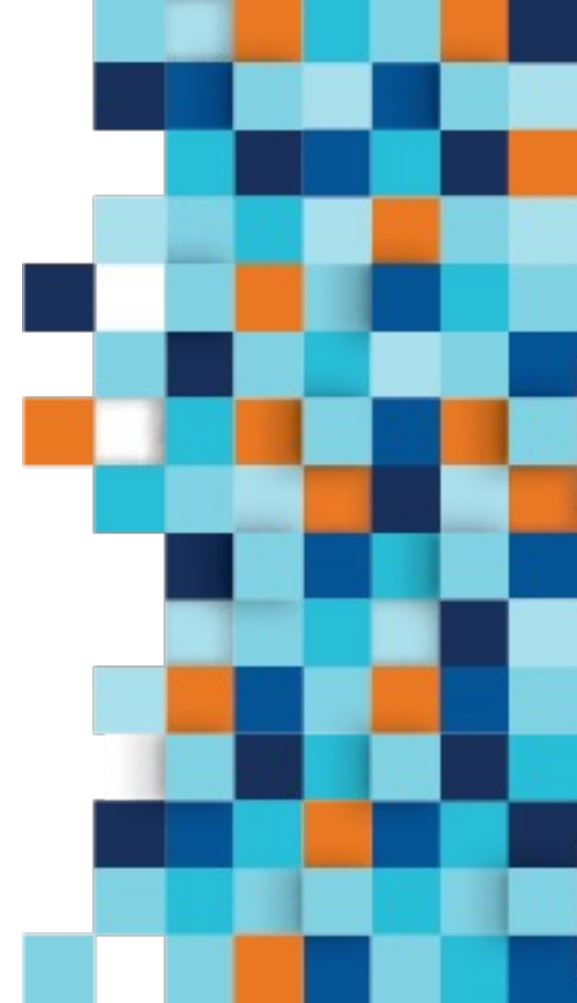
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Tech Talk

Questions and Discussion

