# From Vision to Evaluation:
A Metrics Framework
for the ACCESS Allocations Service

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About ACCESS & ACCESS Allocations

- ACCESS program established in 2022 by NSF to provide central services for an ecosystem of separately funded, mostly HPC resources
- **ACCESS Allocations Service** manages a shared allocations environment and process
- Our metrics framework was developed to help NSF and review panels evaluate the Allocations Service project

https://access-ci.org/
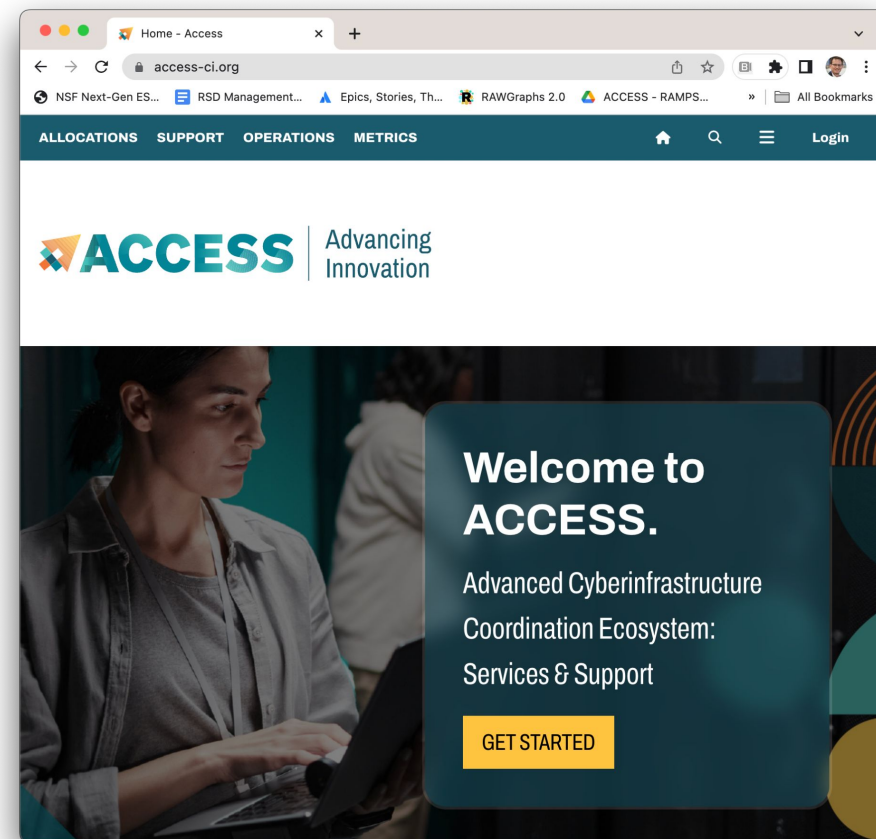
Defining metrics for evaluation

- Successful CI projects will have goals that align with the broad expectations of the solicitation or funding source (right?)
  - Goals may support more than one expectation
  - Your specific goals may not encompass every expectation
- Identifying a *primary* alignment between goals and expectations clarifies how your activities contribute to program expectations and simplifies communication
  - For NSF review panel and others

Alignment of goals for ACCESS Allocations

ACCESS expectations	ACCESS Allocations Goal	KPIs/Metrics
provide key capabilities for discovery and access to resources [for] the evolving portfolio of NSF-funded S&E research	an efficient, scalable, and simplified request and review framework	**KPI:** Ecosystem Access Time + AARC DEI metrics + Ticket resolution metrics
increase user engagement, accessibility, collaboration, and simplified use of CI in dynamic system-of-systems scenarios...	an open, inviting, and democratized allocations marketplace	**KPI:** Democratization Index ● Diversity ● Equity ● Inclusion ● Satisfaction
effective ... use and integration of computing resources into a coherent, coordinated ... ecosystem	a robust, decentralized, and flexible software platform	**KPI:** RP Satisfaction **KPI:** XRAS Uptime + Resource integrations

Plus... project administration, general allocations activity metrics & publication metrics

Data collection methods

- Instrumented software infrastructure (XRAS)
  - For objective measures of CI project activity
- Surveys of users, staff, and resource providers
  - For qualitative & subjective measures

Characteristics of good metrics

relevant to goals

cover all (or most) facets of the goals

possible to influence

composite metrics point to multiple avenues for improvement

possible to get data

goal 1

Create an *open, inviting, and democratized allocations marketplace* to empower a diverse science and engineering community and to provide equitable access across disciplines, computing modalities, institutions, and demographics

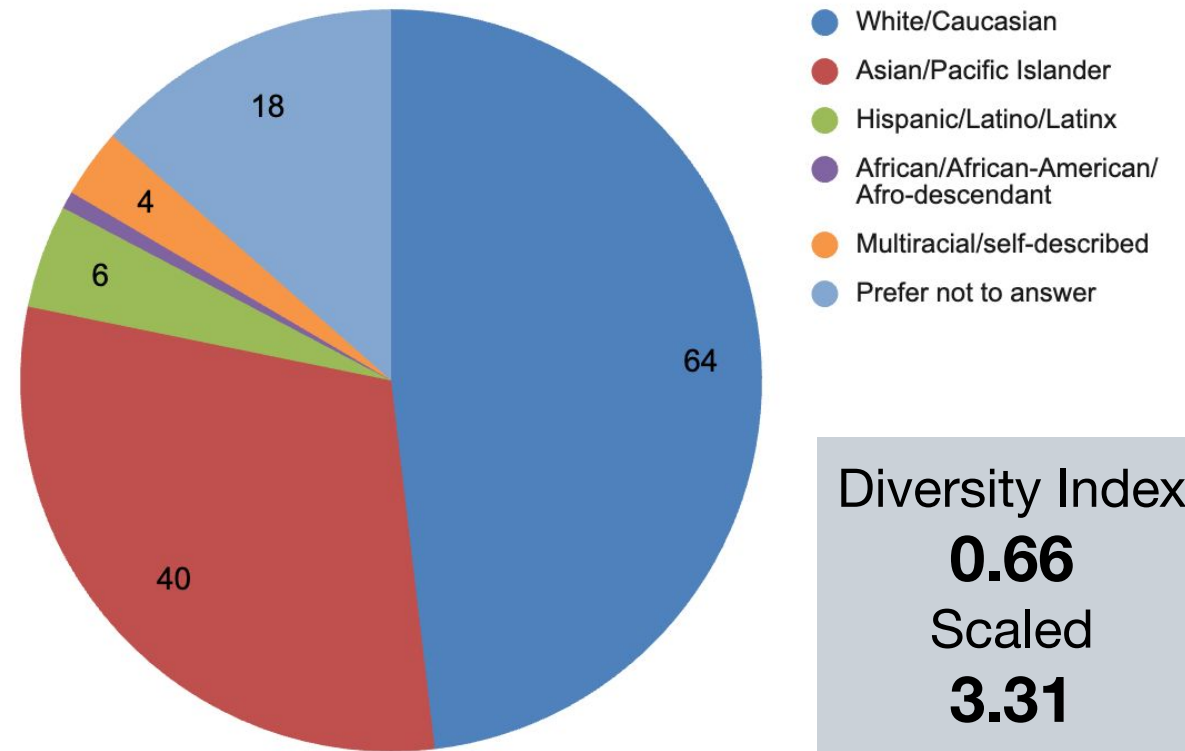| Democratization Index (1-5)		3.59
Institutional diversity (1-5)	The types of institutions represented by users requesting allocations	2.67
Racial diversity (1-5)	Racial demographics in the user community	3.31
Gender diversity (1-5)	Gender demographics in the user community	2.34
Community inclusion (1-5)	Ratings by users on feelings of inclusion within the ACCESS community	4.22
Allocation process satisfaction (1-5)	Average of respondents' ratings of the allocations process	4.10
Alloc. system satisfaction (1-5)	Average of respondents' ratings of XRAS	4.09
Equity index (1-5)	Equity of outcomes across groups	4.40

will be adding Field of Science diversity

Quantifying "diversity"

Simpson's diversity index

- Method used by US Census bureau
- No diversity, index = 0
- Complete diversity, index = 1
- Multiply by 5 to map to a 0-5 scale

$$1 - \left(\frac{\sum n_i(n_i - 1)}{N(N - 1)} \right)$$

Legend:
- White/Caucasian
- Asian/Pacific Islander
- Hispanic/Latino/Latinx
- African/African-American/ Afro-descendant
- Multiracial/self-described
- Prefer not to answer

Pie chart values: 64, 40, 6, 4, 18

Diversity Index
0.66
Scaled
3.31

ACCESS Allocations

NSF

goal 2

Implement an *efficient, scalable, and simplified request and review framework* to reduce real and perceived barriers in connecting researchers to resources

Ecosystem Access Time (days)	12.8
Preparation time (satisfaction)	*4.1*
Median days to request decision	0.6
Median days to first credit exchange	4.0
Median days to approved exchange	1.1
Median days to first resource use	7.1

We intend to roughly quantify preparation time via survey.

Learning from the data collection process

- Collecting data for the phases of ecosystem access time showed also where projects did not complete each phase

- Identified targets for improving the overall user experience.

Project Type	Metric	Year 1
Explore	Requests	654
	Declined	39
	Missing Exchanges	142
	No Job Yet	141
	Active Projects	332
Discover	Requests	334
	Declined	12
	Missing Exchanges	40
	No Job Yet	64
	Active Projects	218

goal 3

Develop a **robust, decentralized, and flexible software platform** to extend the allocations environment into new user communities and encompass novel resources and diverse usage modes

RP Satisfaction & XRAS Uptime

RP Satisfaction

4.1

(1-5 scale, from Operations RP Survey)

XRAS Uptime

99.95%

(from AWS monitoring)

Quantifying flexibility and decentralization

- To describe flexibility, we describe how many resources are integrated into the platform via different options

- For decentralization, we have an Innovative Pilot activity slated for later years

Metric	Year 1
Marketplace-integrated resources	32
Platform-integrated RPs	7
Catalog-integrated resources	2
On-RAMPS deployed	n/a

project oversight

Allocations Service team performance

Metric	Definition	Target	Year 1
Help ticket resolution	Median time to resolve help requests submitted	2 business days	0.75 days
Recommendation responsiveness	Percent of recommendations responded to within 90 days	90%	94.2%
Staff satisfaction	Average of responses to staff survey	4 out of 5	4.66
Plan milestones accomplished	Percentage of the milestones in the annual plan achieved	90%	-

Feedback tracking and metrics

- Feedback items can be "responded to" by
  - Doing now
  - Adding to future work
  - Declining to do
- Tracking feedback via form has proved extremely valuable
  - Google form feeds JIRA project

PY1 Feedback Form Submissions By Month

ACCESS website launched

40

30

20

10

0

July   August   September   October   November   December   January   February   March

Feedback Form Submissions
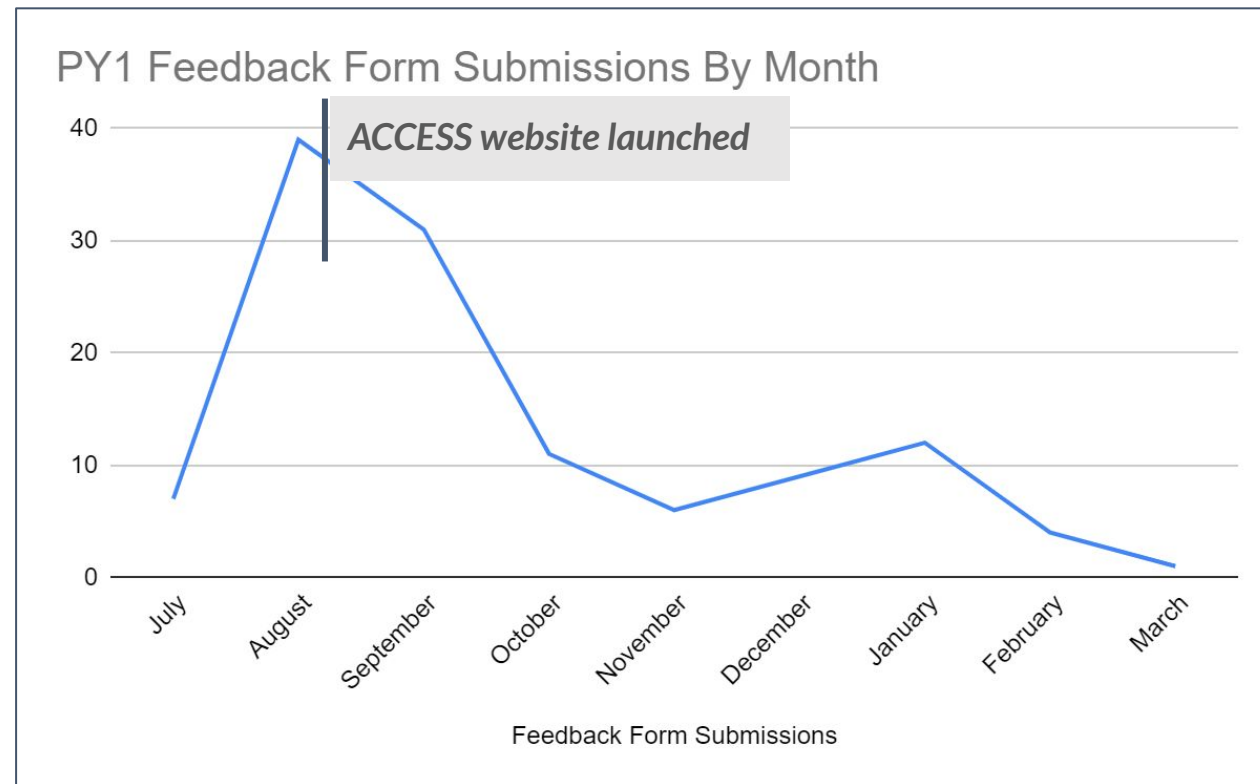
general ecosystem activity

provide context for the goal-oriented metrics, help us monitor and guide the operational aspects of allocations, and describe the ecosystem that the Allocations Service supports

Researcher census metrics	Trends in participation by individuals—new accounts created, open accounts, accounts added to projects, accounts active on resources
Project census metrics	Trends in project activity—open projects, active projects, unique project leads, unique lead institutions
Project type requests	Activity in the different project types defined by our allocation policies
Amounts requested and used	Aggregate resource usage by the different project types
Resource distribution metrics	How requests are spread across the different resources in the portfolio

Researcher "census" trends
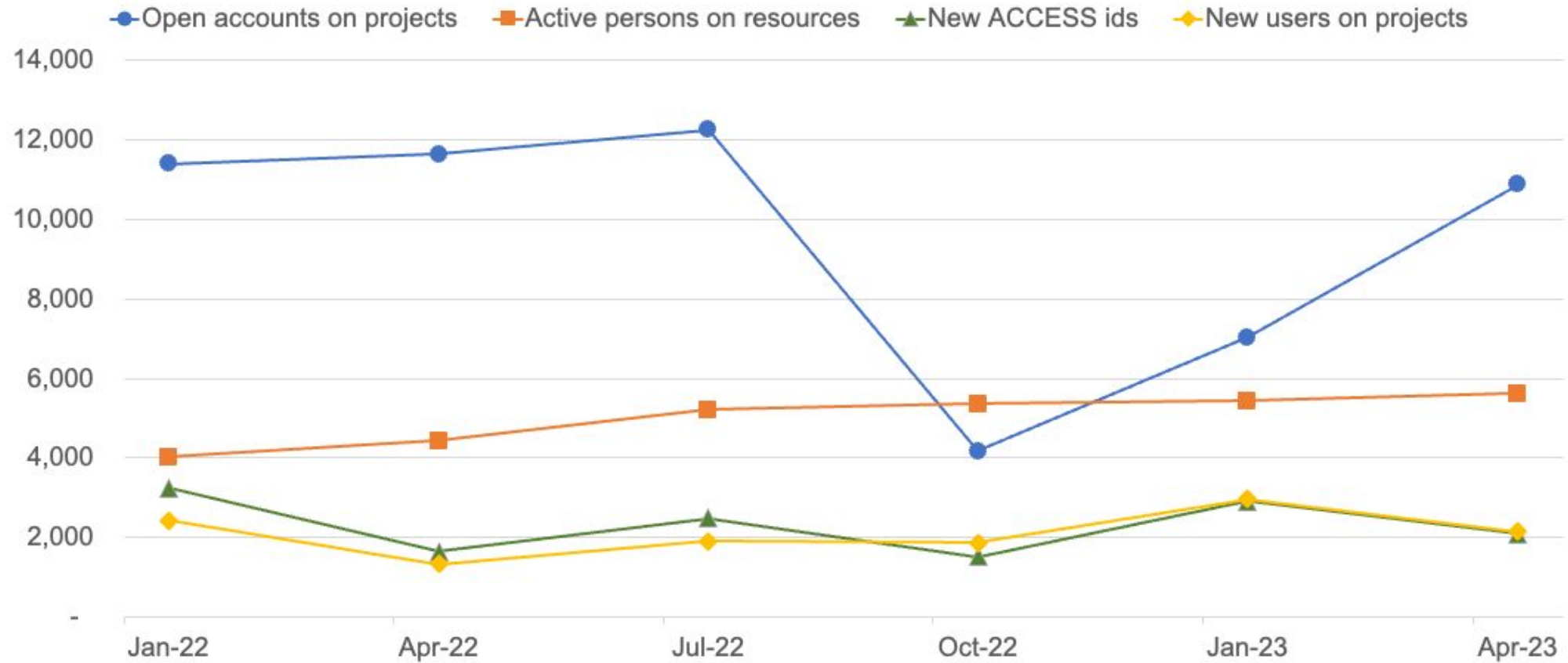
Aggregate resource use by project types
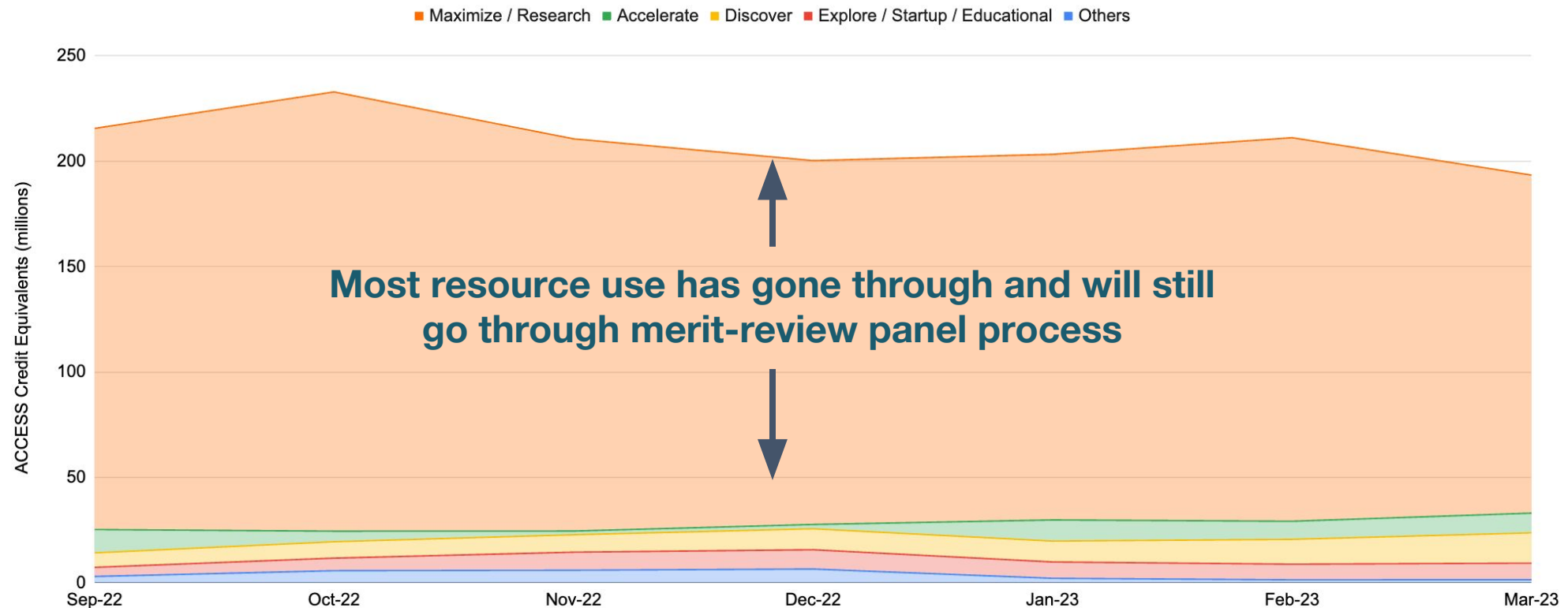
publications

reports of publications and other citable works that have resulted from the use of the ecosystem

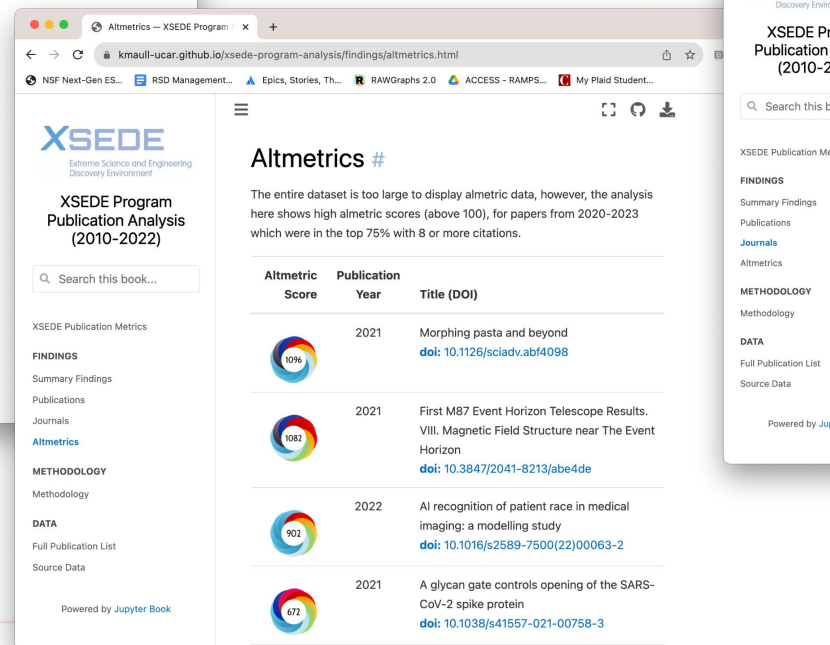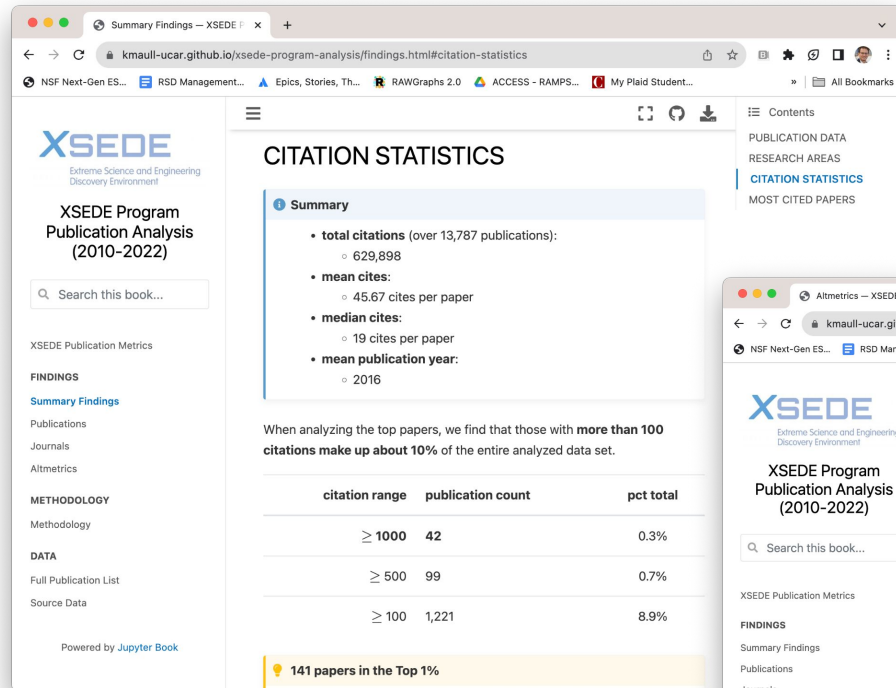Number of citable works by type of work product—journal article, book chapter, conference paper, dissertation, etc.)

Number of citable works reported according to the associated project type

Number of publications by field of science areas

Opportunity	Sep 2022	Q4 2022	Q1 2023	Year 1
Explore ACCESS		33	37	70
Discover ACCESS	12	80	53	145
Accelerate ACCESS	6	39	88	133
Maximize ACCESS	73	236	188	497
Totals	**91**	**388**	**366**	**845**

Future analyses of publications

https://kmaull-ucar.github.io/xsede-program-analysis/

Challenges: Diversity index limitations

- Diversity index cannot capture "quality" of diversity
- Which diversity pattern is "better"
- Gender diversity index will approach 0.5 at best
- Considering how to use variation from a target population

Legend:
- Black / African American
- American Indian / Alaska Native
- Hispanic / Latino
- Asian
- Native Hawaiian / Pacific Islander
- White
- Other / more than one race

Categories:
- ACCESS Users (2.83)
- US STEM Workforce (2.69)
- US Workforce (2.87)
- US Population (3.05)
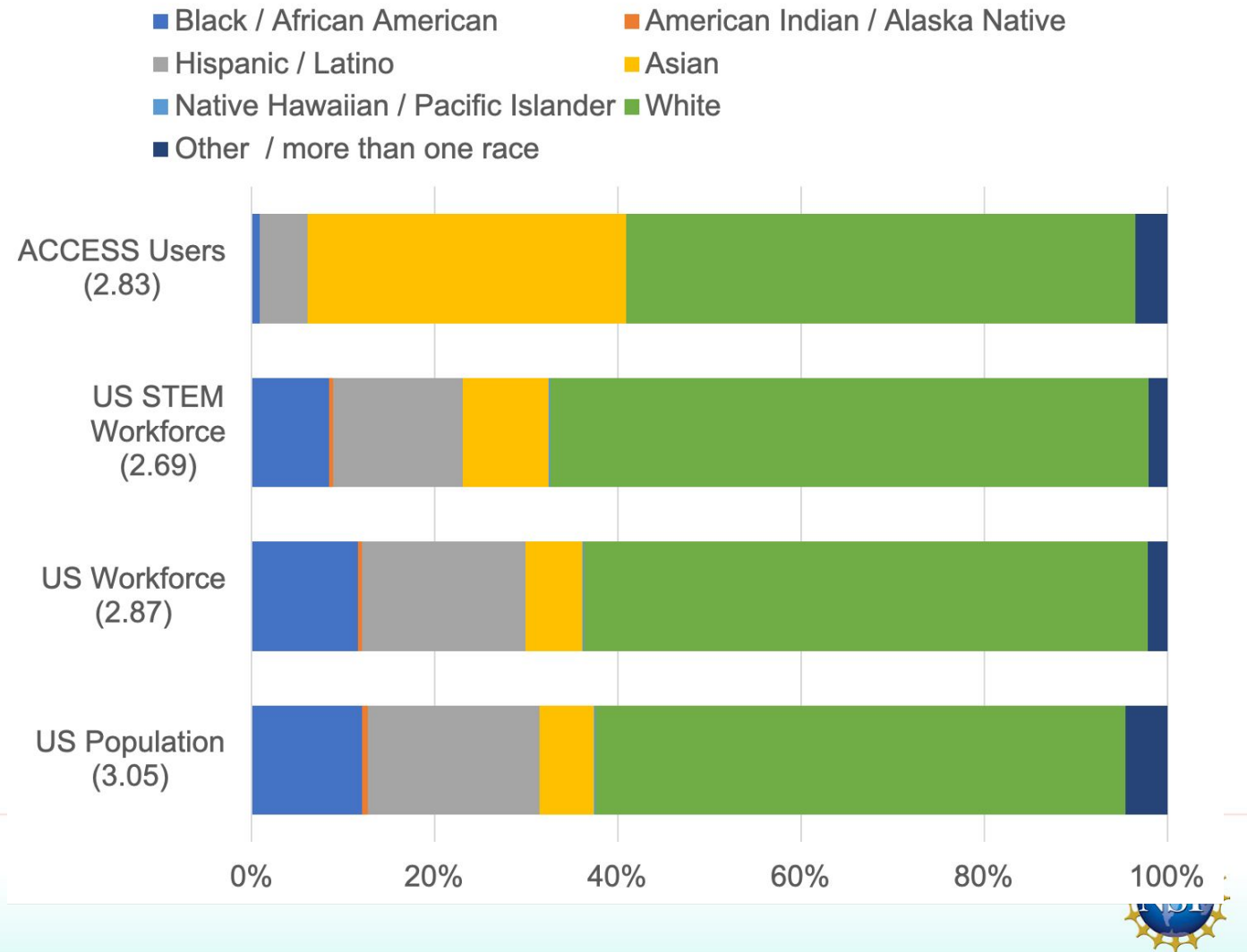
Other considerations and challenges

- How to capturing equity distinctions if we eliminate potential source of inequity?
- Time to access vs. time to science
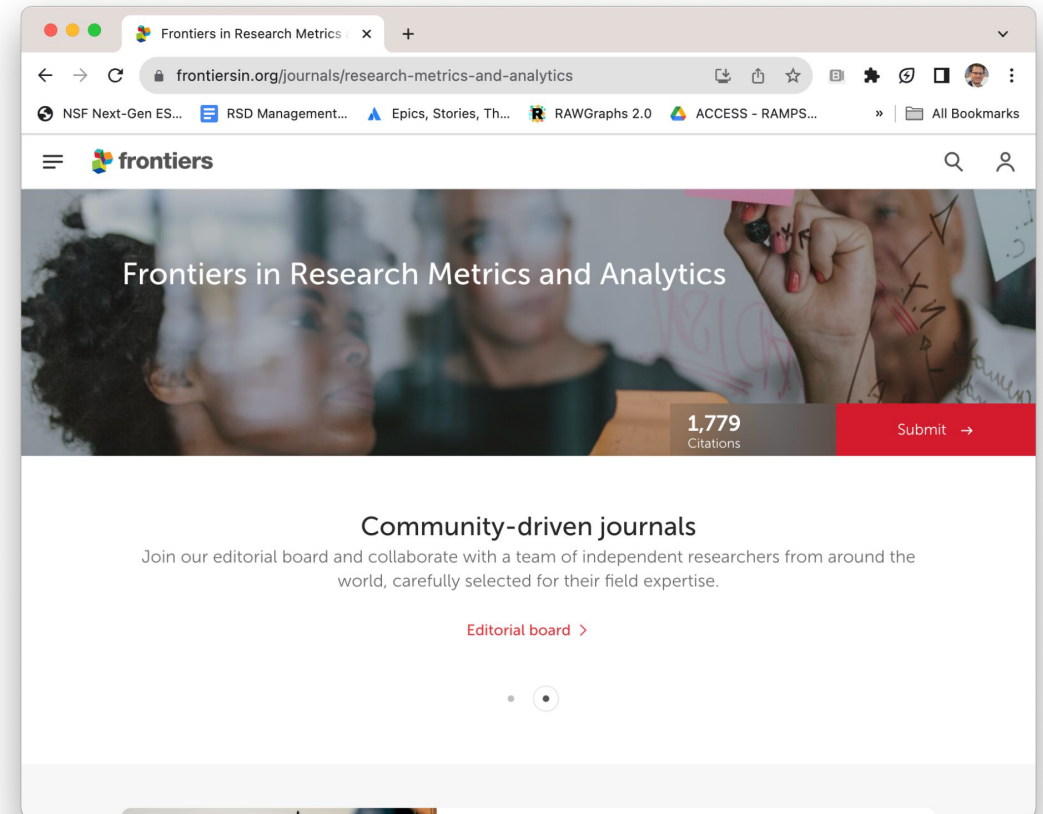- Publications and the science per core-hour trap

Coming soon!

Frontiers in Research Metrics and Analytics

Research Topic:

**Demographics, Evaluation, and Impact:
Assessing the Outputs and Outcomes of
Research Computing and Data Infrastructure**

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Questions?

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