



# Broadening Access to AI Resources Through the National AI Research Resource (NAIRR) Pilot

April 10, 2024

HPC User Forum, Reston, VA

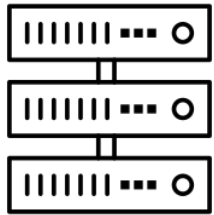
Katie Antypas

Director, Office of Advanced Cyberinfrastructure

# Vision for the National AI Research Resource

---

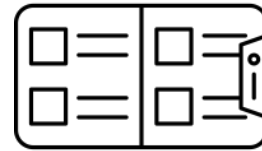
**A widely-accessible, national research infrastructure** that will advance the U.S. AI R&D environment, discovery, and innovation by empowering a diverse set of users through access to:



Secure, high-performance,  
privacy-preserving **computing**



High-quality  
**datasets**



Catalogs of **testbeds** and  
**educational materials**



**Training** tools and **user**  
**support** mechanisms

# Why do we need a NAIRR?

- Many potential contributors lack access to requisite resources which can be costly *as well as* hard to navigate
- Researchers investigating AI to serve the public good require access to resources
- To train the next generation of researchers and AI leaders



# Urgent national goals we are aiming to fulfill with NAIRR



Spur  
**innovation**



Increase the **diversity**  
of talent in AI



Improve U.S. **capacity**  
for AI R&D



Advance  
**trustworthy AI**

- Facilitate *national, coordinated* access to AI resources for the broad research and education community to accelerate discovery and innovation.
- Assure that public interest is strongly represented in AI and drives a responsible and trustworthy AI ecosystem.
- Combine forces across the S&T enterprise to increase AI resource capacity and expertise.

# Full NAIRR Vision vs NAIRR Pilot Goals



## NAIRR Pilot Goals

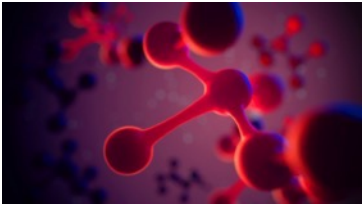
1. Demonstrate the value & impact of the NAIRR concept.
2. Support novel & transformative AI research while reaching broad communities.
3. Gain experience to advance and refine NAIRR design.

**\* NOTE: funding only an estimate from the Task Force. No funding has yet been appropriated for NAIRR.**

# NAIRR Pilot Users



AI Researchers



Domain Scientists  
Applying AI



Students and  
Educators

US-Based Institutions including:

- Academic institutions
- Non-profits
- Federal agencies or federally-funded R&D centers
- State, local, or tribal agencies
- Startups and small businesses with Federal grants

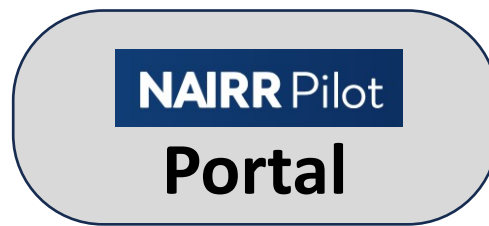
# Initial NAIRR Pilot AI Research Thrusts

- Accelerate societally-relevant research on **AI safety, reliability, security, and privacy**.
- Empower advances in **cancer treatment and individual health outcomes**.
- Support resilience and optimization of **agricultural, water, and grid infrastructure**.
- Improve design, control, and quality of **advanced manufacturing systems**.
- Address **earth, environmental, and climate challenges** via integration of diverse data and models.

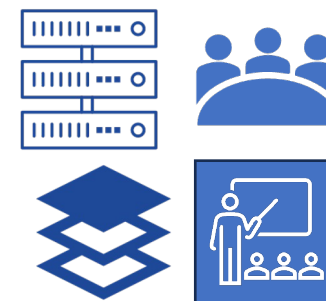


# NAIRR Pilot Organization

User Journey



<https://nairrpilot.org>



**Pilot Resources  
and Opportunities**

The NAIRR Pilot provides infrastructure and resources; it does not fund end-user research.

Operations

**NAIRR  
Open**

Enable open AI research and access to diverse AI resources via a central portal and coordinated allocations

**NAIRR  
Secure**

Enable AI research needing privacy and security-preserving resources. Assemble exemplar privacy preserving resources.

**NAIRR  
Software**

Facilitate use of AI software, platforms, tools and services across platforms

**NAIRR  
Classroom**

Reach new communities through education, training, user support and outreach



**Governance**



**Community Design  
Process**





# Bringing together the strengths of government, private industry and non-profit partners

---

## *Contributing Partners*

### **Agencies**

- National Science Foundation
- Defense Advanced Research Projects Agency
- Department of Agriculture
- Department of Defense
- Department of Energy
- Department of Veterans Affairs
- National Aeronautics and Space Administration
- National Institutes of Health
- National Institute of Standards and Technology
- National Oceanic and Atmospheric Administration
- US Geological Survey
- US Patent and Trademark Office (USPTO)

### **Non-governmental orgs**

- AI2: Allen Institute for AI
- AMD
- Amazon Web Services
- Anthropic
- Cerebras
- Databricks
- Datavant
- EleutherAI
- Google
- Groq
- Hewlett Packard Enterprise
- Hugging Face
- IBM
- Intel
- Meta
- Microsoft
- MLCommons
- NVIDIA
- Omidyar Networks
- OpenAI
- OpenMined
- Palantir
- Regenstrief Institute
- SambaNova Systems
- Vocareum
- Weights & Biases

# Contributions to the pilot go far beyond compute

---

## Contributed Resources

- Access to computing hardware, systems and testbeds
- Cloud computing credits and access to associated models, data and software platforms
- Software and platforms
- Open models, datasets and PETs
- API access to closed models
- Educational platforms online notebooks for students
- Enhanced training, expertise and user support.



# Transparent and responsible AI will be a key focus of pilot



Advance  
**trustworthy AI**

- Goal is to be transparent with NAIRR pilot processes
  - Evaluation of requests and standards for NAIRR pilot contributions
  - Community outreach
  - Transparent operational policies
  - Training and User support
- Convening/workshop with NIST and NIH on how pilot can support Trustworthy AI in planning stages
- NAIRR Pilot ACCI subcommittee can help address these issues

# Pilot launched Jan 24<sup>th</sup> with 11 agency and 25 non-governmental partners

The screenshot shows the NAIRR Pilot Portal website. At the top left, the logo reads "NAIRR Pilot" with the subtitle "National Artificial Intelligence Research Resource Pilot". To the right, a dark blue button says "NAIRR Pilot Portal". The URL <https://nairrpilot.org/> is displayed in the center. On the right side, it says "Built by SGX3". Below the URL are three main sections, each with a button and an upward-pointing arrow:

- SURVEY OF US RESEARCHERS, EDUCATORS, AND STUDENTS** with a button "Fill out survey".
- APPLY FOR COMPUTING** with a button "Apply for computing".
- PILOT RESOURCES** with a button "View Pilot resources".

Responses from ~1000 responses, from nearly all states indicating strong need for computing data and educational/training resources

Initial call closed March 1<sup>st</sup> > 150 submissions, reviews underway

Initial datasets and trainings opportunities

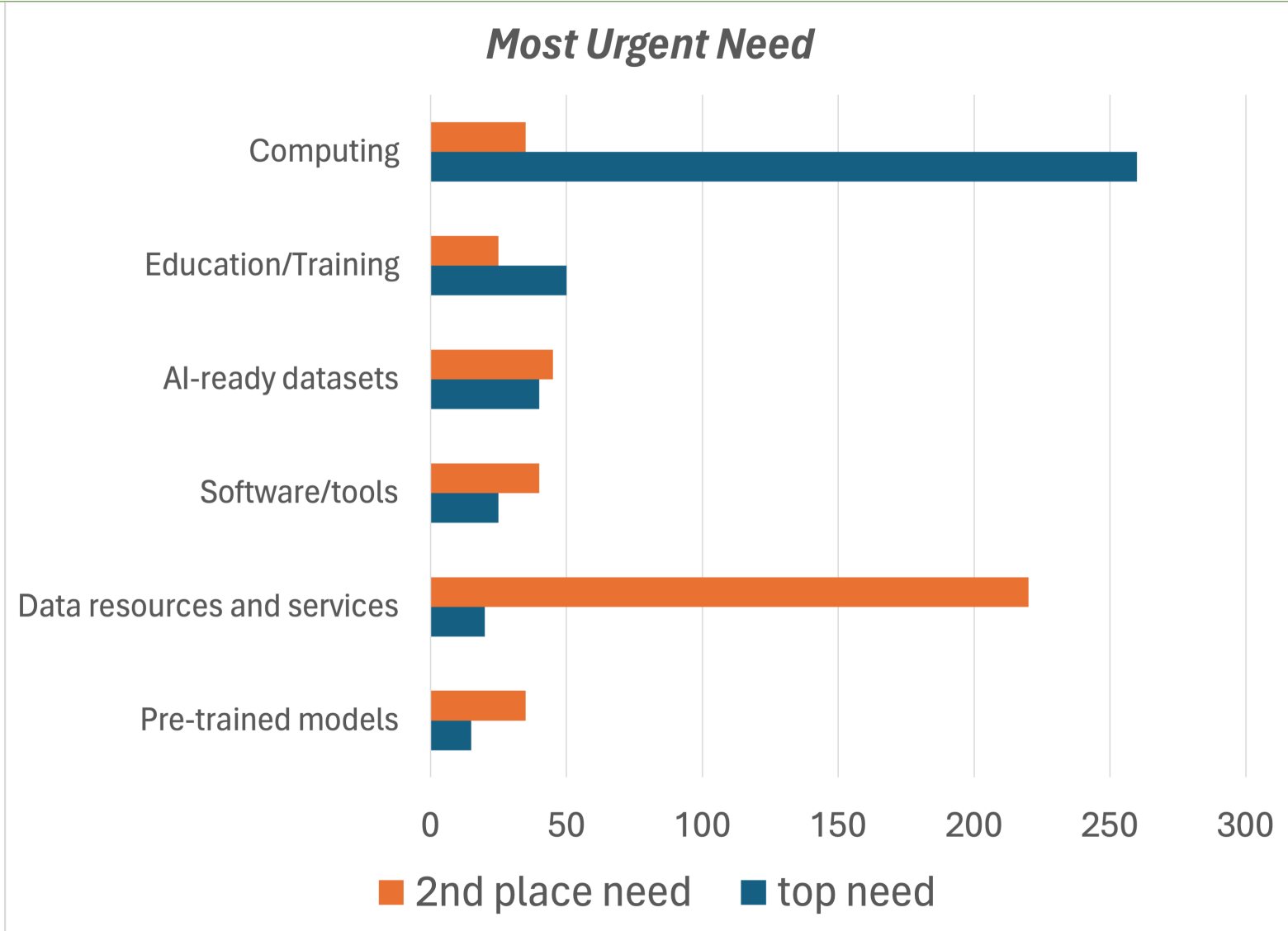
# Early peak at RFI on Use Cases Responses

---

## *How would you use the NAIRR?*

<b>Perform AI research</b>	<b>Apply AI to Domain</b>	<b>Perform R&amp;D for product</b>	<b>As an instructor</b>	<b>Learn about AI</b>	<b>Other</b>
295	390	164	244	201	39
22%	29%	12%	18%	15%	3%

# Early peak at survey interim results



# We are analyzing text questions:

---

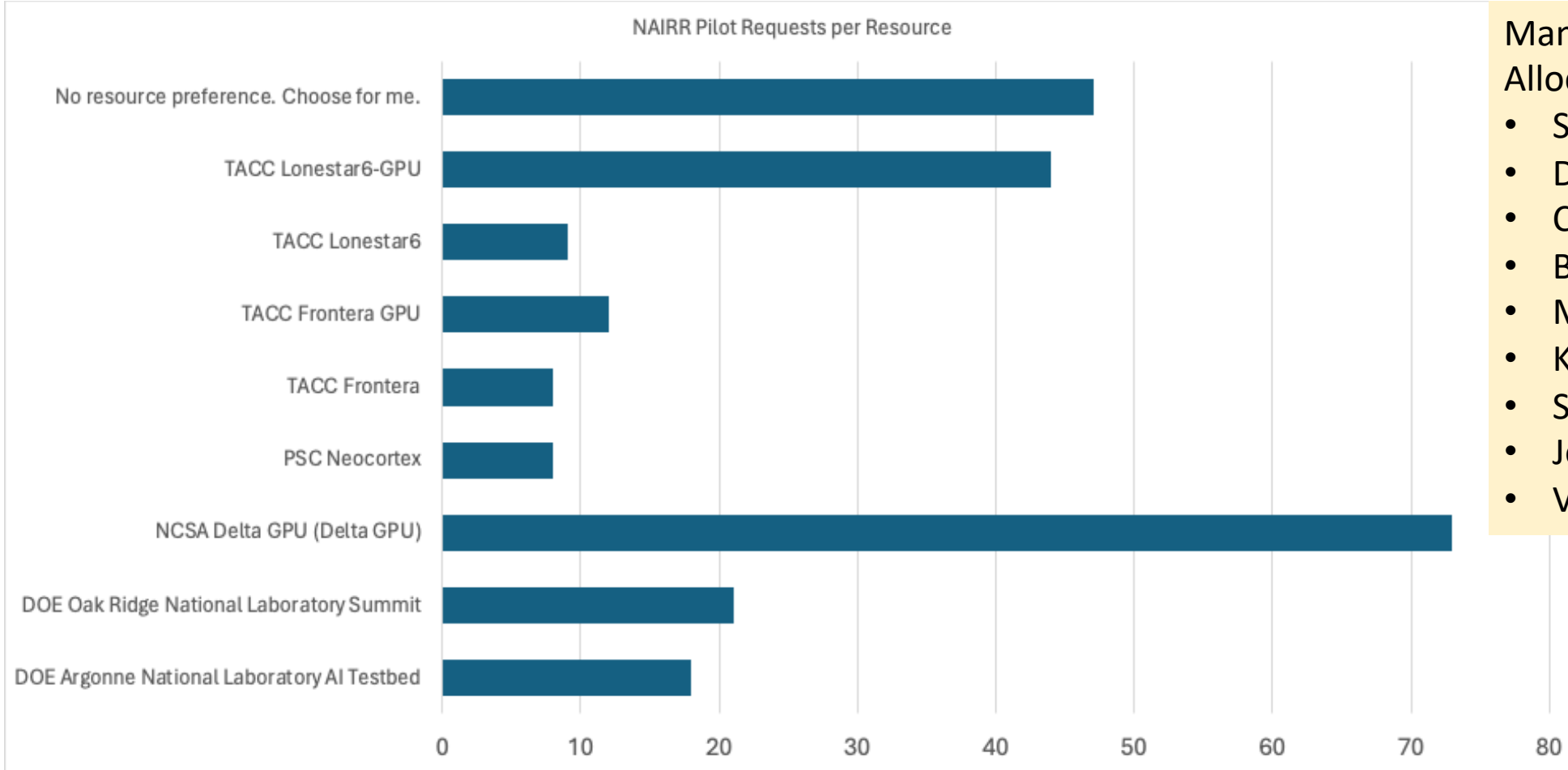
- Barriers and challenges

- *AI on the edge is a challenge because of the size of the parameter files. Hence, we need model compression techniques beyond quantization and sparsification.*
- *Accessing data across different states is particularly important for our project. However, currently, datasets are in different formats and require individual requests to access.*
- *Our main barrier is access to compute. We don't have sufficient compute in a university setting. We barely have enough to train the smallest models.*

- To what extent do you need training and user support?

- *None. Just computation. My students and I can troubleshoot*
- *For research applications, advice on particular methods and their limitations would be valuable.*
- *My group is still at the beginning of using AI. We need a lot of guidance.*

# First open call for compute results in > 150 requests



Many thanks to our Allocations WG:

- Stephen Deems – PSC
- Dave Hart – NCAR
- Chris Keeley – UIUC
- Bronson Messer – ORNL
- Mike Norman – SDSC
- Katherine Riley – ANL
- Shava Smallen – SDSC
- John Towns – UIUC
- Veronica Vergara – ORNL

*Second open opportunity for researchers to apply for access target for late April – will include additional agency resources and private/non-profit sector resources*





*Reach new communities through education, training, user support and outreach.*

- Integrate partner resources and expertise to broaden opportunities for AI skill training and enhance classroom experiences.
- Convene a NAIRR Classroom working group of community members to orchestrate this effort.
- Enable workshops, hackathons and other community engagement activities.

## EducateAI (NSF 24-025)

Seeks to advance  
**inclusive AI education**



- Enable AI education experiences for preK-12, **undergraduate and graduate** students, and professionals in emerging industries.
- Emphasizes broadening participation of underrepresented and underserved groups,
- Leveraging the NAIRR Pilot to support AI-related research and workforce training

# Data and Networking Challenges and Opportunities

---



Data growing in size and complexity



Data pipelines, staging and wrangling often dominate researcher time



Data quality and fairness is of top concern



Data often needs to be transferred to reside close to compute



Edge computing for sensors and detectors add new use cases



Developing a data discovery services that provides incentives for community datasets



Data policies that enable trustworthy AI

# Data and Networking Challenges and Opportunities



Data growing in size and complexity



Data pipelines, staging and wrangling often dominate researcher time



Data

*Our strategy in the pilot is to address data challenges through specific use cases and demonstration projects*



Data



Edge computing for sensors and detectors add new use cases

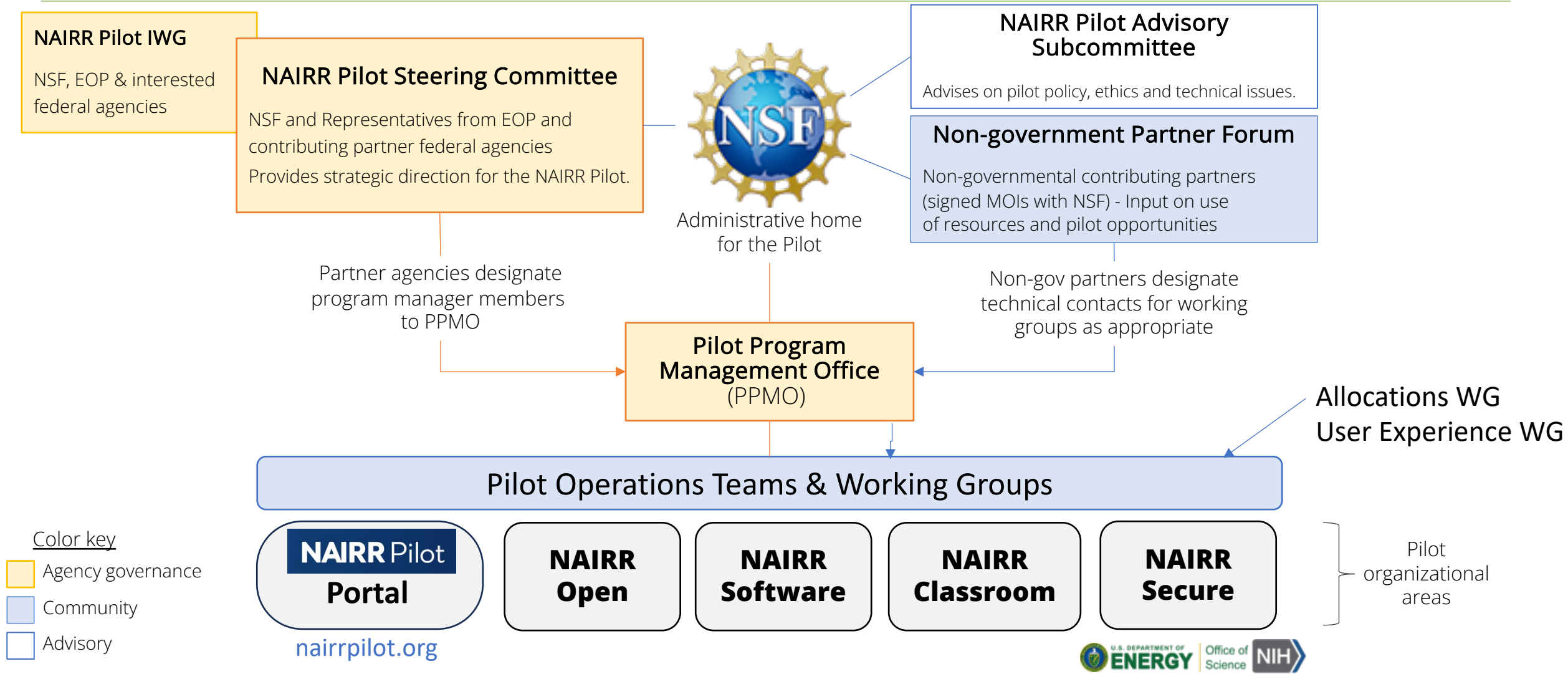


Developing a data discovery services that provides incentives for community datasets



Data policies that enable trustworthy AI

# NAIRR Pilot governance and operations organization



# NAIRR Pilot governance and operations organization

## Pilot Operations Working Groups

### **Allocations WG**

- Oversees the allocations process: request submission -> allocation recommendation

### **Matching Committee**

- Matches resources to appropriate allocation requests

### **User Experience WG**

- Oversees the allocated users' support and tracking process

We are working on standing up additional WGs

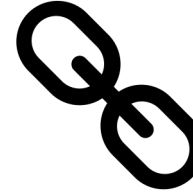
# Many anticipated challenges...



Democratization: reaching broad communities



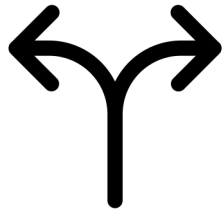
Assuring trustworthy & responsible AI in research space



Interoperability of resources



Data access, quality, curation, pipelines



Divergent software stacks



Applying design patterns across domains, NAIRR Open and Secure



On-boarding & user support

*Community engagement and design is imperative to success of NAIRR pilot*

# The NSF NAIRR Pilot Team



**Katie Antypas**  
OAC



**Amy Walton**  
OAC



**William Miller**  
OAC



**Tess  
deBlanc-Knowles**  
OD/TIP



**Varun Chandola**  
OAC



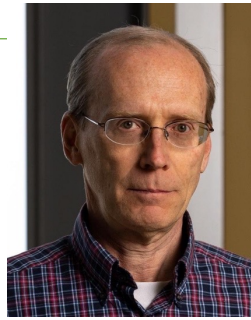
**Dan Bullock**  
AAAS Fellow OAC



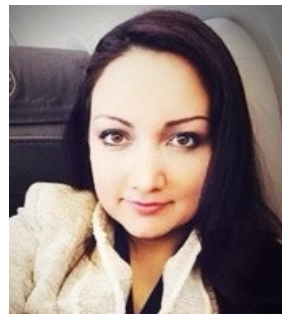
**Sharon Geva**  
OAC



**Alejandro Suarez**  
OAC



**Marlon Pierce**  
OAC



**Maria Fernanda  
Pembleton, CISE**



**Sheikh Ghafoor**  
OAC



**Juan (Jen) Li**  
OAC



**Vivica Brooks**  
CISE Directorate



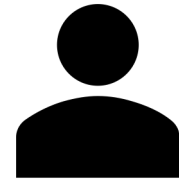
**Christine Christy**  
OAC



**Alice Kamens**  
TIP



**Kerstin Mukerji**  
TIP



**Gabrielle Cates**  
OAC



**Michael Litman**  
IIS



**Wendy Neilson**  
IIS



**Jim Donlan**  
IIS



**Jeff Forbes**  
CNS



**Ellen Zegura**  
CNS



**Dilma DaSilva**  
CISE



**JD Kunda**  
CISE



**Joshua Chamot**  
OLPA

# Questions and Discussion

