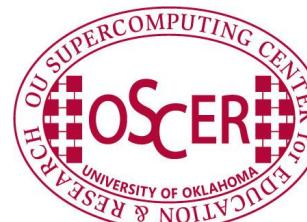


Who Are the Campus Champions?

PEARC20

Henry Neeman
University of Oklahoma
Campus Champions/XSEDE Campus Engagement
Campus Research Computing Consortium



Thanks to Dana Brunson for much of this content!

A national community of practice, facilitating computing- and data- intensive research and education



Every US state

Every EPSCoR
jurisdiction

<https://www.xsede.org/community-engagement/campus-champions>



XSEDE
Extreme Science and Engineering
Discovery Environment

Our community of over 700 Campus Champions, at over 300 institutions, **promotes and facilitates the effective participation** of a diverse national community of academic and not-for-profit institutions in the **application of advanced digital resources** and services to accelerate discovery, enhance education, and foster scholarly achievement.



There are over **700** Campus Champions

Including CI organization leaders,
faculty, researchers, students, as well as
research-enabling and systems
professionals

At over **300** academic, non-academic,
and not-for-profit research-focused
institutions

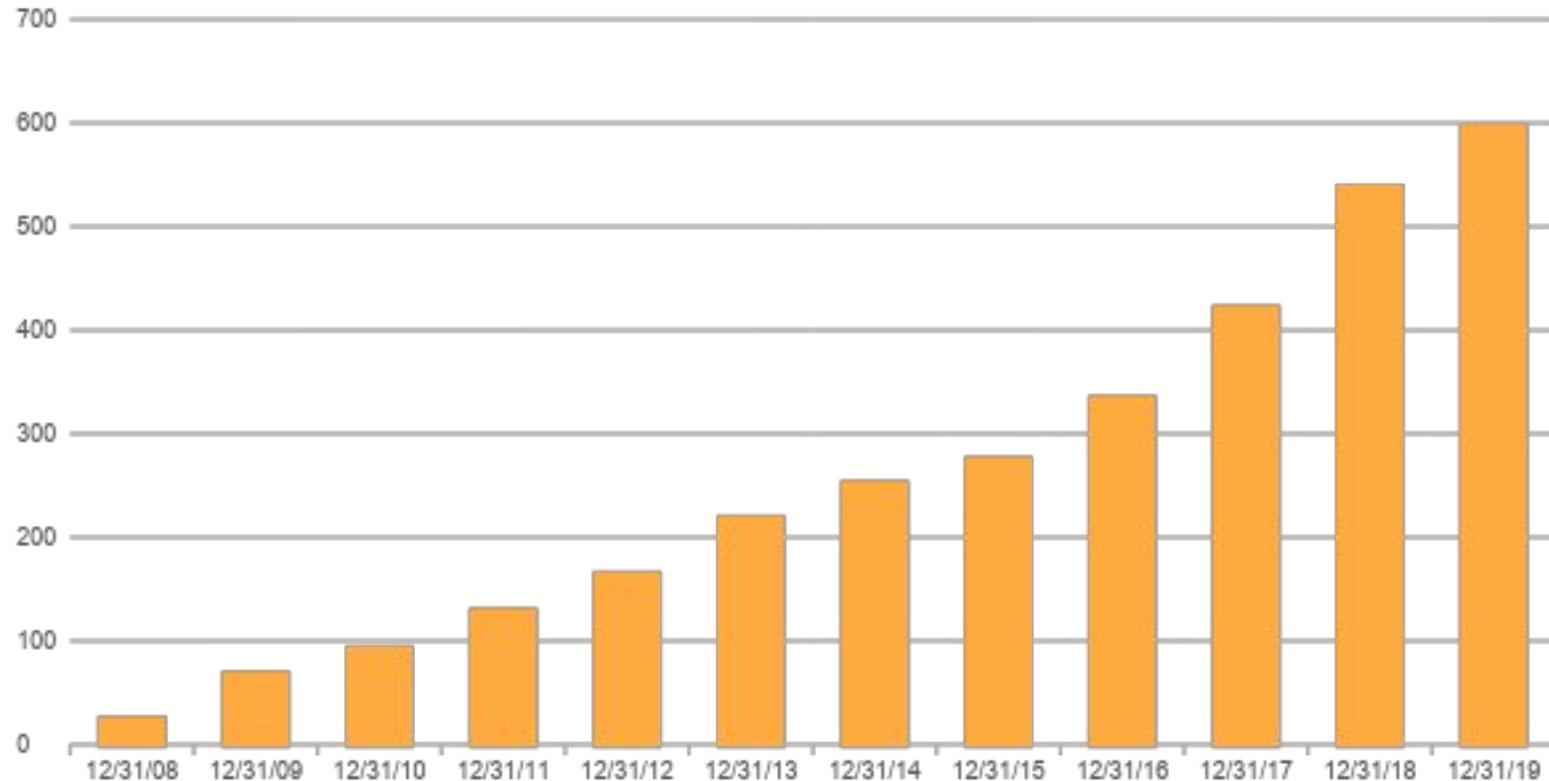
<https://www.xsede.org/community-engagement/campus-champions>



XSEDE

Extreme Science and Engineering
Discovery Environment

Growth of Champions – an emerging profession



CI Professional Roles: The Facings

- Researcher-facing (e.g., CI Facilitators)
- Systems-facing (e.g., sysadmin, network engineer)
- Sponsor/Stakeholder-facing (e.g., HPC center director)
- Software-facing (e.g., Research Software Engineer)
- Data-facing (e.g., Research Data Librarian)

What is a Cyberinfrastructure Facilitator?

- Work with users – researchers and educators – to help them improve their research and/or education productivity and aspirations via advanced Cyberinfrastructure (CI).
- Typically, one or a few CI Facilitators have responsibility for an entire institution, or multiple institutions.
- At some institutions, CI Facilitation is part time; at others, it's full time.

Some CI Facilitators are:

- faculty or former faculty;
- postdocs or former postdocs;
- research staff or former research staff;
- IT professionals;
- graduate or undergraduate students.

Virtual Residency

- We created a program to teach people how to be research computing facilitators, and ultimately to be institutional CI leaders.
- Workshops: Introductory 2015, 2016, 2017; Intermediate/Advanced 2018, 2020; Introductory/Intermediate 2019
 - Planning for the 2021 workshop starts soon
- Regular conference calls
- Grant Proposal Writing Apprenticeship (2017-18, 2018-19, 2019-20)
- Paper Writing Apprenticeship (2018-19, 2019-20: PEARC'19, PEARC'20 papers)
- Lead by Henry Neeman at OU, funded through a variety of NSF grants (CC*, XSEDE/Champions, CaRCC)
- Attendees: 924 from 370 institutions, including 74% of CC institutions

Campus Research Computing Consortium

An organization of dedicated professionals developing, advocating for, and advancing campus Research IT and associated professions.

Current focus areas include:

- People Network – year-round virtual conference
- Connecting the broader Research IT ecosystem
- Professionalization and workforce development
- Developing a common Capabilities Model for Research Computing and Data
- <https://carcc.org/>

CaRCC People Network tracks:

- **Researcher-facing:** Outreach, education/training, consulting/facilitation, leasing collaborations, etc.
- **Systems-facing:** Systems planning, engineering, security, optimization, middleware, virtualization, and cloud, among other topics.
- **Data-facing:** Data management, publishing/sharing, data science, data visualization, data workflows, data transfer and networks, among other topics.
- **Emerging Centers:** Support for smaller or developing research computing and data centers.
- **Software-Facing:** Software development, portability, installation, optimization, support, etc. (Launching at a future date)
- **Sponsor/Stakeholder-facing:** Project and personnel management, service evaluation, funding/finance, and running a research computing and data team, among other topics. (TBD in collaboration with CASC.)

Growth of CI Facilitators

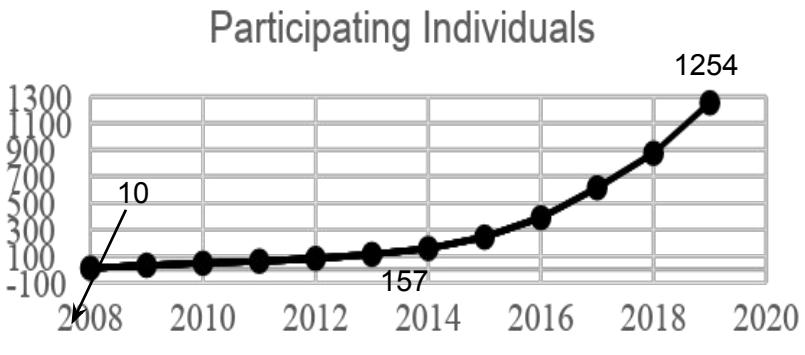


Fig. 1: The number of distinct individuals participating in the Campus Champions and/or Virtual Residency and/or CaRCC Researcher-Facing Track, 2008-19.

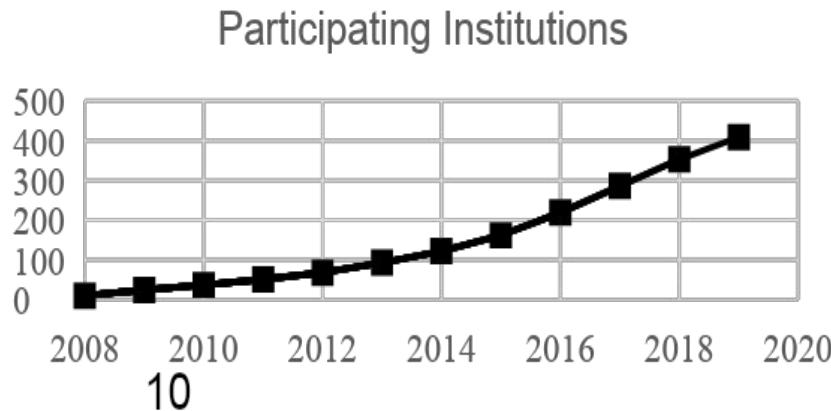


Fig. 2: The number of distinct institutions participating in the Campus Champions and/or Virtual Residency and/or CaRCC Researcher-Facing Track, 2008-19.

Survey of CI Organization Leaders

ASKED OF CI ORGANIZATION LEADERS

- How many distinct individuals are CURRENTLY employed as CI Facilitators at your institution (whether full time or part time)?

R1 Mean: 7.3; n: 47 R2 Mean: 2.7; n: 15

- How many ADDITIONAL distinct individuals do you EXPECT to need as CI Facilitators at your institution within the COMING 5 YEARS (whether full time or part time)?

R1 Mean: 5.5; n: 47 R2 Mean: 2.2; n: 15

$(7.3 + 5.5) \times 130$ R1s with central on-premise CI +

$(2.7 + 2.2) \times 82$ R2s with central on-premise CI =

University of Oklahoma
Institutional Review Board
exemption #11498, 12/2/2019

2066 CI Facilitators by 2025: 77% growth from 2020 to 2025!

@ R1s and R2s that currently have central on-premise CI

Survey of CI Facilitators

ASKED OF CI FACILITATORS

- What is your BEST ESTIMATE of the TOTAL NUMBER of distinct individual researchers to whom you have provided, and will provide, CI Facilitation, during your ENTIRE CAREER as a CI Facilitator (past and future)?

Mean: 1802 researchers served over a CI Facilitator's career

n: 136 CI Facilitators

University of Oklahoma
Institutional Review Board
exemption #11320, 10/28/2019

Therefore, over their full Facilitation careers, CI Facilitators will serve, to the nearest order of magnitude, about a million researchers!

Connecting the Ecosystem (people view)

Connect community members and organizations to leverage one another

Explore and advance the ever-changing ecosystem of research cyberinfrastructure

Identify gaps not well served in the current ecosystem

Participating organizations (Spring 2019 workshop)

- Association of Research Libraries (ARL)
- Big Data Hubs
- Campus Champions (CC)
- Campus Research Computing Consortium (CaRCC)
- The Carpentries
- Coalition for Academic Scientific Computation (CASC)
- Coalition for Networked Information (CNI)
- Education Opportunities (HPC University, SIG HPC Education)
- EDUCAUSE
- EPOC/CI Engineers
- Global Environment for Network Innovations (GENI)
- HPC Systems Professionals
- Midscale Experimental Research Infrastructure Forum (MERIF)
- Minority Serving Institution/ Historically Black Colleges & Universities
- Open Science Grid (OSG)
- Quilt (Regional Networks)
- Research Data Access & Preservation Association (RDAP)
- Women in HPC (WHPC)
- XSEDE (Extreme Science and Engineering Discovery Environment)

More CI Professional Groups

- CyberAmbassadors
- Cyberinfrastructure Engineers
- Linux Clusters Institute
- Science Gateways Community Institute
- Trusted Cyberinfrastructure
- United States Research Software Engineer Association
- United States Research Software Sustainability Institute

Takeaways - what we could do together

- Enable communications and trust (“warm hand-offs”)
- Balance cooperation and competition
- Advocate on public policy
- Advance CI preparation, training, and professionalization
- Establish an authoritative and comprehensive clearinghouse
- Facilitate access to research computing expertise
- “Count” indicators of diversity & create women in HPC chapters

Each participant gave one word as a concluding comment at the workshop



Favorite concept: **Boundary Spanners**

QUESTIONS?

I love questions

Thank You!

Henry Neeman

Director, OU Supercomputing Center for Education & Research, U Oklahoma
hneeman@ou.edu

Many thanks to Dana Brunson for much of this content!

CaRCC Professionalization workshop

Co-Creation (partnering with researchers): Research computing and data professionals are co-creating methods and software models; Collaborative process, very different from delivery of traditional IT and software services

Career Paths are incomplete in most organizations; creating challenges for recruiting, developing and retaining these professionals.

Digital: The exponential growth of digital technologies underlies work; accelerating change in the work due to changes in hardware, software, systems, and the nature of the data itself.

Status: Work of research computing & data professionals generally held in high regard by faculty with whom they work; important status and power differences between these professionals and principle investigators that are part of a larger “two-tier” culture in most university settings.

Terminology: Work centered on “cyberinfrastructure for research” and touches on many related domains, including “data science” and “high performance computing.” This work is distinct from, but connected to the work of “information technology” professionals.

Products: Job Families Guide and HR matrix available at carcc.org

Research IT Capabilities Model

- Internet2 workshops, discussions starting early 2018
 - Gathered a range of people/roles, and institution types
 - December 2018 Workshop developed draft model
- Working group refined draft, built beta tool
 - Reviewed consistency, granularity of questions, etc.
 - Developed spreadsheet-based beta implementation
- PEARC19 workshop and one at Educause 2019
- First public version released to workshop participants Jan 2020



Trusted CI: The NSF Cybersecurity Center of Excellence

Our mission: to lead in the development of an NSF Cybersecurity Ecosystem with the workforce, knowledge, processes, and cyberinfrastructure that enables trustworthy science and NSF's vision of a nation that is a global leader in research and innovation.



<https://trustedci.org/>

Trusted CI Cybersecurity Fellows

- Empower the fellows with knowledge of cybersecurity and Trusted CI's services.
- Fellows serve as cybersecurity liaisons to their respective communities.
- Fellows assist members of the community with basic cybersecurity challenges and connect them with Trusted CI for advanced challenges.

2020 Applications Due Friday, Jan 17!

<https://trustedci.org/fellows>





Trusted CI – Quilt – Regionals Collaboration – new in 2020

- Inspired by a workshop at the 2018 Fall Quilt meeting that brought together **Campus Information Security Officers** and **Research Computing Leads**.
- Train-the-trainers approach at Quilt meeting, workshops then occur at regional meetings.
- Bring Research Computing, Security, and Networking folks together!
- Will need a lot of community input to make this impactful.
- Are you interested in doing this at the GPN annual meeting?

Renaissance Teams

Renaissance Teams: Reifying the School at Athens

- The Renaissance ideal: a single individual could excel in many fields.
- The volume and diversity of human knowledge grows so fast, that the possibility of knowing everything has long past.
- This has given way to hyperspecialization of knowledge and limits the sharing of ideas.
- How can we create holistic understanding? With collaborating, transdisciplinary teams. Challenges include:
 - structures that reward individual achievement rather than collaboration and
 - our propensity to debate the finely nuanced gradations, while the deep holistic questions vex us.

Derived from a blog post by Dan Reed, U of Utah, also with credit to Donna Cox at U of Illinois:

https://www.hpcdan.org/reeds_ruminations/2018/08/renaissance-teams-reifying-the-school-at-athens.html

Renaissance Teams

A group of individuals with complementary skills and talents, capable of feats not possible by any one individual alone.

- First, each team member must have an eager **willingness to share** expertise within their discipline and an equal **humility and willingness to learn** from their partners.
- Second, the team must be committed to an **aspirational objective** whose achievement is worthy of unreserved commitment.
- Third, team members must unhesitatingly **sacrifice personal fame and success for the greater good** and in pursuit of the shared objective.
- Fourth, the team leader must create and nurture an environment where **disparate voices are heard and respected**, regardless of social rank or intellectual reputation.

Renaissance Team for Cyberinfrastructure

A proposal:

- A researcher-facing person (aka facilitator, research engagement pro)
- A computing expert
- A storage expert
- A network expert
- A security expert
- Others too (stakeholder/sponsor-facing, outreach, communications, project mgmt, research software engineer, data lifecycle manager, etc)

Imagine a world where every researcher has access to a team like this?
(Even at non-R1 institutions!)

So...

- All these national level efforts are great, but...
- They only have short term funding.
- People are hesitant to reach out to national organizations for help.
- What are the challenges?
- What are the opportunities?

Up next: How the GPN region is overcoming these challenges and has become a model for others.

GPN region has been a model of this for years.



OneOklahoma Cyberinfrastructure Initiative

<http://www.oneocii.okepsc.org/>

[**ACI-REF Virtual Residency**](#)



<http://www.showmeci.org/>

GPN Cyberinfrastructure Program
Committee ([CIP](#))



ENCITE:

Enhancing Cyberinfrastructure by
Training and Engagement

<https://www.greatplains.net/archives/presentations/>

Universities in the Region Directly Impacted by CC* Grants

[Black Hills State University](#)

[Cameron University](#)

[East Central Oklahoma University](#)

Fort Hays State University

Kansas State University

[Langston University](#)

Northeastern State University

[Oklahoma State University](#)

[Oral Roberts University](#)

[Rogers State University](#)

[South Dakota School of Mines and Technology](#)

South Dakota State University

[Southwestern Oklahoma State University](#)

University of Arkansas

University of Arkansas at Pine Bluff

University of Central Oklahoma

University of Kansas

University of Missouri-Columbia

University of Missouri-Kansas City

University of Nebraska-Lincoln

University of Oklahoma Norman Campus

University of South Dakota Main Campus

[University of Tulsa](#)



The Great Plains Regional CyberTeam

Challenge:

Supporting computational and data-intensive research at under-resourced institutions in rural states is challenging.

Rural states have:

- Sparse populations
- Fewer trained CI staff
- Smaller research output
- Less participation in national CI community.

Broader Impact:

- Drives CI development and adoption in EPSCoR States
- Enables advancements on campuses currently underserved by advanced CI
- Develops and disseminates CI best practices for an effective CyberTeam



Approach:

- Bring CI expertise directly to rural campuses.
- Cross-institutional distributed support team with 4 key foci:
 - Networking
 - System Administration
 - Security
 - Researcher Training and Outreach
- Leverages existing collaboration model of regional networks
- Pairs regional mentors with mentees and students
- Onsite campus engagement focused on enabling specific science workflows

Conclusion

- Research Cyberinfrastructure is complex and evolves quickly.
- Research CI people – recognized as an emerging profession (and we need some aspects of what professions have – career tracks, training, etc)
- The GPN region is a recognized leader.

What's next?

- Keep up the cross-talk between the different areas! Show up to those GPN zoom calls!
- Support the boundary spanners who can bridge between areas of expertise and connect others when they need solutions.
- What else?

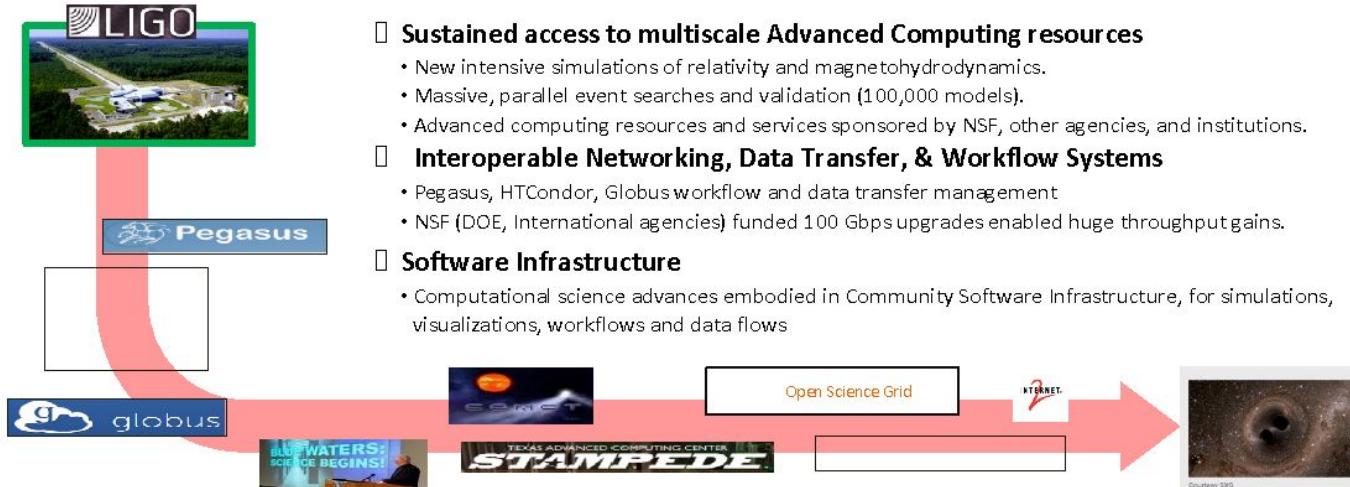
Status of researchers' relationship with advanced digital technologies

It's Complicated.



It's Complicated – but we can overcome it together.

Gravitational wave detection enabled by NSF investments in technology and people



NSF programs: Data Building Blocks (DIBBs), Software Infrastructure (SI²), Network Infrastructure and Engineering (CC*NIE, IRNC), and others. Complementary Investments by other federal agencies and international entities.

Motivation for exploring the research IT ecosystem

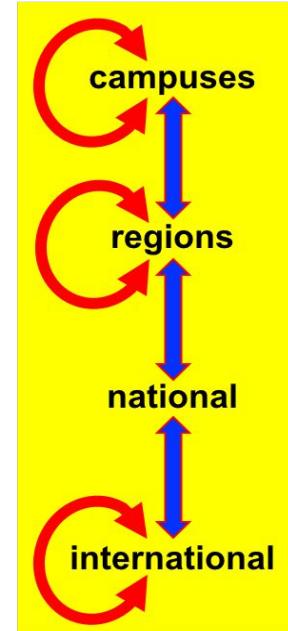
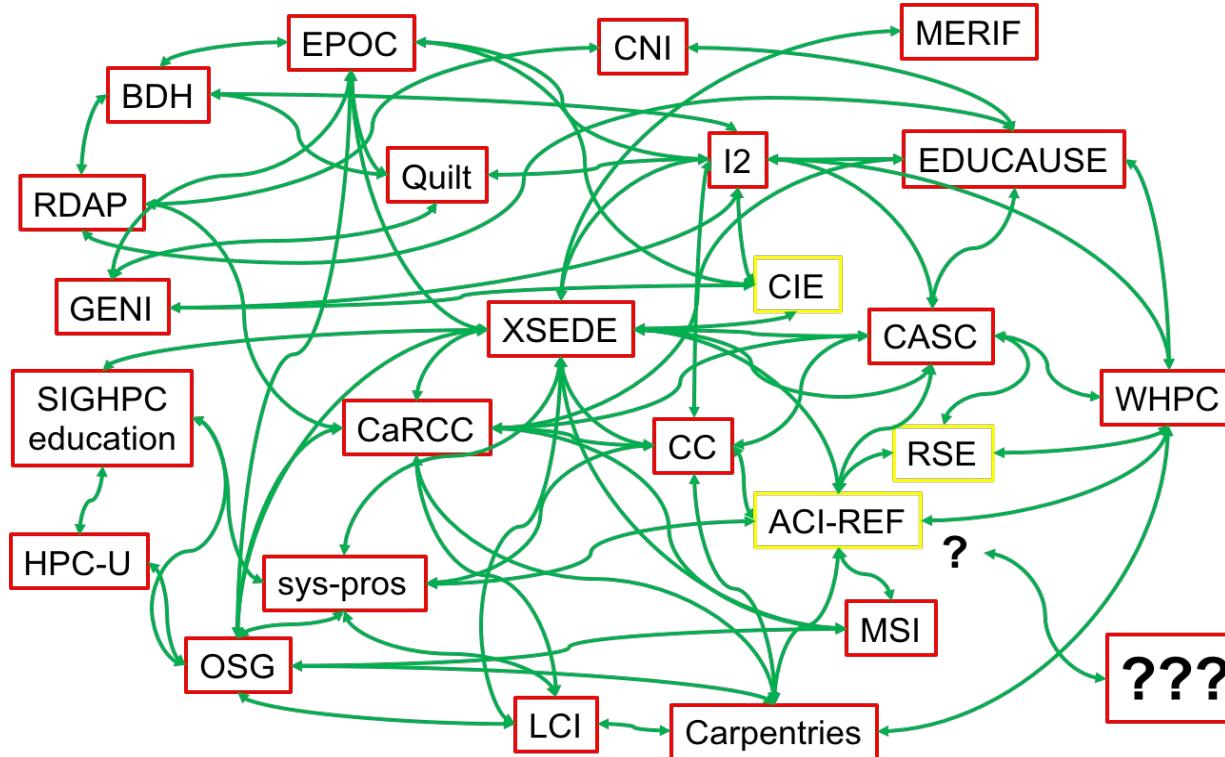
How can we make it easier for researchers and facilitators* to **make sense of the available resources and services** across the ecosystem?



* facilitators = all of us

Mapping the ecosystem

What we need: Inclusivity, collaboration, sustainability, gap filling, deep engagement, involvement, trust, ...



A few examples

- XSEDE (coordination services – allocations, training, engagement, support, and other activities)
- Open Science Grid (high throughput, opportunistic computing)
- The Supercomputing Centers (allocated via XSEDE, mostly)
 - TACC (Stampede, Frontera, Wrangler, etc)
 - SDSC (Comet, Expanse, Cloudbank, etc)
 - NCSA (Blue Waters)
 - PSC (Bridges)
- Campus Champions
- Campus Research Computing Consortium (CaRCC)

(Thanks to investments from the National Science Foundation)

XSEDE Overview

XSEDE:

- Is an NSF-funded virtual organization (current grant expires 8/31/2021)
- Integrates and coordinates the sharing of advanced digital services (e.g. supercomputers, visualization, data analysis resources)
- Serves researchers nationally to support science
- Provides users with seamless integration to NSF's high-performance computing and data resources

<https://www.xsede.org/>

<https://portal.xsede.org/>

XSEDE: Research computing resources available

| | | | | | |
|---------|-------------------|--|---------|----------|--------|
| TACC | Stampede2 | Dell/Intel Knights Landing, Skylake System | 368,280 | 12,800.0 | |
| TACC | Wrangler | Long-term Storage | | | 10,000 |
| TACC | Ranch | Long-term tape Archival Storage | | | 61,440 |
| SDSC | Comet | Dell Cluster with Intel Haswell Processors | 46,752 | 2,000.0 | |
| SDSC | Comet GPU | GPU Nodes | 1,728 | 104.0 | |
| SDSC | Data Oasis | Medium-term disk storage | | | 4,000 |
| PSC | Bridges | Regular Memory | 21,056 | 894.6 | |
| PSC | Bridges GPU | Bridges GPU | 1,344 | 894.6 | |
| PSC | Bridges GPU-AI | Bridges GPU-Artificial Intelligence | 16 | 9.9 | |
| PSC | Bridges Large | Large Memory Nodes | 160 | 894.6 | |
| PSC | Bridges Pylon | Storage | | | 10,000 |
| IU/TACC | Jetstream | Cloud, VMs, HTC | 15,360 | 516.1 | |
| IU/TACC | Jetstream Storage | Storage | | | 960 |
| OSG | OSG | Open Science Grid, HTC | 60,000 | 50.0 | |
| LSU | superMIC | Cluster | 7,200 | 925.0 | |

XSEDE: Allocations

Eligible: Almost all U.S.-based university and non-profit researchers

Cost: none

Available to:

- Experienced HPC users with large-scale needs
- New users in computational science, visualization, or data analysis
- Those deploying a science gateway
- Support academic courses and training activities

Types of allocations:

- Campus Champion
- Startup
- Research
- Education

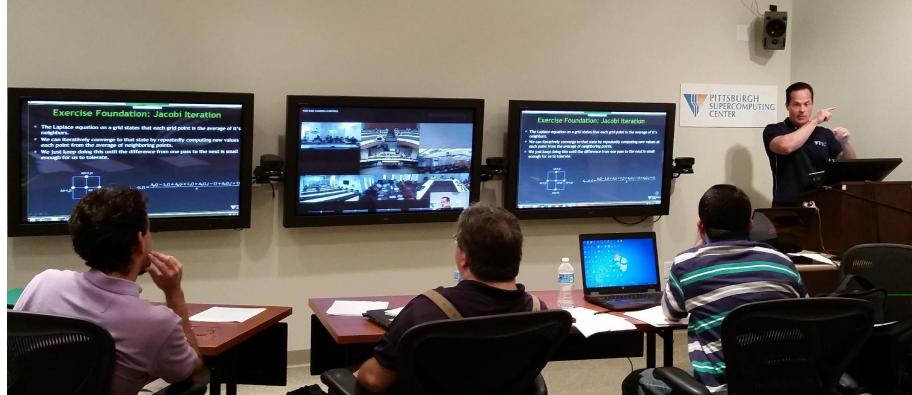
<https://portal.xsede.org/allocations/announcements>

XSEDE Training

Training is available in a variety of formats, including multicast, webinars, online training, and in person workshops. Suggestions for new topics are encouraged via the [feedback](#) form. For more information, see:

- [XSEDE Training Overview](#) for a summary guide of materials available
- [XSEDE Training Course Catalog](#) including listings across formats and sites
- [Course Calendar](#) with registration for upcoming training courses
- [Online Training](#) on materials relevant to XSEDE users
- Badges are available
- Roadmaps are in development

Training materials focus on systems and software supported by the XSEDE Service Providers, covering programming principles and techniques for using resources and services. Training classes are offered in high performance computing, visualization, data management, distributed and grid computing, science gateways, and more.





Open Science Grid

Submit locally, run globally.

The Open Science Grid (OSG) provides the national fabric of distributed high throughput computing, serving researchers across a wide variety of scientific disciplines.

Over 125 institutions
sharing resources

Over 500,000 research
computing jobs a day

Over 925,000,000 CPU
hours in the last year



Scalable, shared resources for:

- *individual researchers • multi-institutional collaborations*
- *institutions and their research computing providers*

opensciencegrid.org