



2023 INTERNET2 TECHNOLOGY exchange

Facilitating RCD Community Success
September 19, 2024

Dana Brunson, Internet2, Research Engagement
John Hicks, Internet2, Research Engagement
Timothy Middelkoop, Internet2, Research Engagement

The Internet2 Research Engagement Team



Why is supporting research important to Internet2?

It's part of our **mission**.

- Research is the “R” in “R&E”. It's part of our DNA.
- We have a strategic initiative to “Improve focus on research”.

It's **valuable** to our community.

- It supports the research enterprise at our community institutions and organizations.
- Research is a core part of Internet2 value proposition.

It **drives the demand** for Internet2 services.

- Research drives the need for innovation in technologies that Internet2 develops.
- Research drives adoption of technologies that Internet2 provides.
- Research drives development of these technologies.

The Research Computing & Data Landscape is complex



Research is Constantly Changing

The Challenge for Researchers:

- **Research and scholarship is now reliant on computing and data infrastructure, services, and support** across most disciplines.
- Research is more frequently **conducted** by **widely dispersed communities** that are sharing **larger, more complex data sets** and using **more sophisticated tools**.
- **A rapidly increasing level of knowledge and skill is required** to make effective use of research computing and data infrastructure and services.
- Many researchers simply cannot keep up.

The role of RCD+ Professionals:

- For research that relies on technology, **support from a highly skilled workforce is now required.**
- **This workforce is an emerging profession:** The Research Computing and Data (RCD+) professional community.

Institutions cannot realize their full research potential without a strong RCD workforce.

What we know today

Researchers struggle to take advantage of ever-evolving RCD technology

- They have no time to become technology experts
- They rely heavily on RCD professionals for tech services, support and facilitation.

Institutions need support and guidance

- To boot-strap, grow, and sustain their programs
- To explain to leadership how RCD is critical to research
- To recruit, retain, and develop RCD professional staff

RCD professionals are clamoring for a shared voice

- To advocate for the profession
- For broader understanding of their roles
- For training, mentoring, and professional development resources.

Research Engagement at Internet2

Internet2 Facilitation for RCD/Research Community

- Support RCD/Research to effectively leverage Internet2 offerings.
- Support and collaborate with Internet2 colleagues in on key projects that address current and future challenges.
- Be a conduit for information flow between RCD and Internet2.

RCD Community Facilitation – Engaging, coordinating, and leading the community to address common challenges (via NSF funded RCD Nexus, CaRCC, MS-CC, ERN, etc)

- Best practices clearinghouse
- Workforce development focus
- Institutional RCD Capabilities assessment, impact measurement, strategic communication
- International RCD cooperation/collaboration

Advocate for RCD/Research Communities between institutional administrators, national funding agencies, professional organizations, and the private sector

Research Engagement at Internet2

Internet2 Facilitation for RCD/Research Community

- Support RCD/Research to effectively leverage Internet2 offerings.
- Support and collaborate with Internet2 colleagues in on key projects that address current and future challenges.
- Be a conduit for information flow between RCD and Internet2.

RCD Community Facilitation – Engaging, coordinating, and leading the community to address common challenges (via NSF funded RCD Nexus, CaRCC, MS-CC, ERN, etc)

- Best practices clearinghouse
- Workforce development focus
- Institutional RCD Capabilities assessment, impact measurement, strategic communication
- International RCD cooperation/collaboration

Advocate for RCD/Research Communities between institutional administrators, national funding agencies, professional organizations, and the private sector

Community Needs Drive Our Priorities

Sources of Community Input:

- 2017 CaRCC Stakeholder Mapping Survey
- 2020 NSF CI Workforce Workshop
- 2021 RCD Workforce Survey
- 2021 RCD Career Arcs Survey
- 2021 Missing Millions Report
- 2021 MS-CC Stakeholder Mapping
- 2022 RCD Professionals Stakeholder Pulse Survey
- 2022 NSF ACCI Workforce Working Group Report
- 2022 CaRCC Strategy retreat
- CaRCC & RCD Nexus Advisory Committees
- RCD Nexus Day @PEARC22
- 2023 CaRCC Strategy Retreat
- RCD Nexus Day @PEARC23

Key Findings: Institutions and RCD+ professionals are clamoring for curated resources and a shared voice to:

- Help recruit, retain, and develop RCD+ professional staff
- Advocate for the profession and broaden understanding of their roles
- Provide training, mentoring, and professional development resources
- Better understand the RCD+ landscape and their own institutional strengths
- Increase diversity, equity, and inclusion

Who is CaRCC?



Many contributors - <https://carcc.org/our-thanks>

Jay Alameda, University of Illinois, Urbana-Champaign
Troy Baer, Ohio Supercomputer Center
Gladys Karina Andino Bautista, Purdue University
Venice Bayrd, Montana State University
John Blaas, National Center for Atmospheric Research
Justin Booth, Michigan State University
Tara Borland, University of Alaska
Jim Bottum, Clemson University
Geoff Boushey, UC San Francisco
Carrie Brown, Penn State University
Dana Brunson, Internet2
Katia Bulekova, Boston University
Cyd Burrows-Schilling, UC San Diego
Zach Byerly, Louisiana State University
Laura Carriere, NASA
Sarvani Chadalapaka, UC Merced
Dhruva Chakravorty, Texas A&M
Cathy Chaplin, Internet2
Shafaq Chaudhry, University of Central Florida
Thomas Cheatham, University of Utah
Dirk Colbry, Michigan State University
Galen Collier, Rutgers University
Jane Combs, University of Cincinnati
Martin Cuma, University of Utah
Joel Cutcher-Gershenfeld, Brandeis University
Deborah Dent, Jackson State University
F. Alex Feltus, Clemson University

Bob Freeman, Harvard University
Kimberley Grash, University of Chicago
Fred Harris, University of Nevada Reno
Brian Haymore, University of Utah
John Hicks, Internet2
Betsy Hillery, Purdue University
Gwen Jacobs, University of Hawaii
Douglas Jennewein, Arizona State University
Kerk Kee, Texas Tech
Rich Knepper, Cornell University
Shelley Knuth, University of Colorado Boulder
Christina Koch, University of Wisconsin - Madison
Amy Kosshofer, University of Cincinnati
Gail Krovitz, Internet2
Elizabeth Leake, STEM TREK
Jim Leous, Penn State University
Julie Ma, MGHPCC
Tobin Magle, Northwestern University
Christina Maimone, Northwestern University
Sara Mannheimer, Montana State University
Ruth Marinshaw, Stanford University
Deb McCaffrey, University of Michigan
Lauren Michael, University of Wisconsin - Madison
Bill Michener, University of New Mexico
Timothy Middelkoop, Internet2
Claire Mizumoto, UC San Diego

Amy Neeser, UC Berkeley
Janna Nugent, Northwestern University
Barr von Oehsen, Rutgers University
Arman Pazouki, Northwestern University
Sai Pinnepalli, Louisiana State University
Sam Porter, University of Maryland
Wirawan Purwanto, Old Dominion University
Annelie Rugg, UC Los Angeles
Patrick Schmitz, Semper Cogito
Erin Shaw, University of Southern California
Jerry Sheehan, San Diego State University
Andy Sherman, Yale University
Kurt Showmaker, Jacksons Labs
Alan Silver, University of Wisconsin - Madison
Preston Smith, Purdue University
Tracy Smith, University of Illinois
Dan Stanzione, Texas Advanced Computing Center
Ashley Stauffer, Penn State University
Scotty Strachan, University of Nevada Reno
John Towns, NCSA
Pips Veazey, University of Maine
Jason Wells, Bentley University
Karen Wetzel, EDUCAUSE
Jim Wilgenbusch, University of Minnesota
Scott Yockel, Harvard University
Nuyun Zhang, Georgia Institute of Technology
Anita Orendt, University of Utah

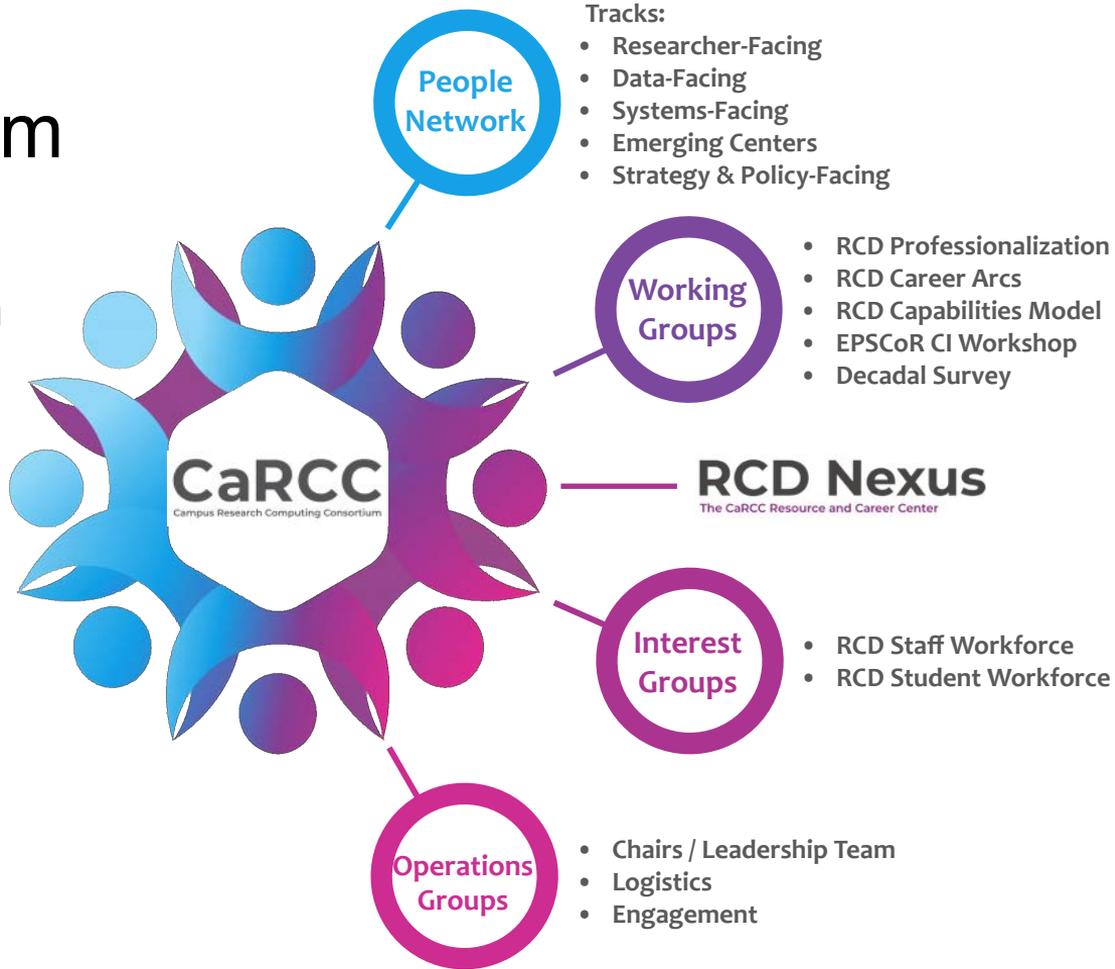
... from many institutions

University of California Berkeley
Montana State University
University of Maryland
STEM TREK
Cornell University
University of Utah
University of Cincinnati
NCSA
University of California San Diego
Michigan State University
San Diego State University
University of Michigan
Brandeis University
Texas A&M
Jacksons Labs
Ohio Supercomputer Center
Internet2
University of California San Francisco
Old Dominion University
University of Illinois at Urbana-Champaign
Purdue University
Bentley University
University of Colorado Boulder
EDUCAUSE
Massachusetts Green High Performance Computing Center
University of Minnesota
Rutgers University
Arizona State University
Semper Cogito
University of Alaska
University of California Merced
University of Nevada Reno
Yale University
Harvard University
Georgia Institute of Technology
National Center for Atmospheric Research
University of California Los Angeles
Purdue
Northwestern University
Boston University
Stanford University
University of Wisconsin - Madison
Texas Tech
University of Hawaii
Jackson State University
TACC
University of Chicago
University of Southern California
Clemson University
Penn State University
NASA
University of Central Florida
Louisiana State University
University of Maine
University of Illinois

Campus Research Computing Consortium

An organization
advancing the frontiers of research
by improving the effectiveness
of RCD professionals,
including their
career development and visibility,
and their ability to
deliver services & resources
for researchers.

<https://carcc.org/>



CaRCC's People Network = *Inclusive Community*

A year-round virtual conference to share/leverage expertise in various facings (Tracks)



Data-Facing Track:

Discussions of analysis, curation, preservation, compliance, movement



Emerging-Centers Track:

Issues of interest to newer or emerging RCD service leaders and programs



Researcher-Facing Track:

Topics include consulting, bridging, facilitation, outreach, training



Systems-Facing Track:

Discussions around hardware, networks, security, compliance, data centers



Software-Facing Track -> US-RSE:

Development or contribution to research software, scripts, workflows

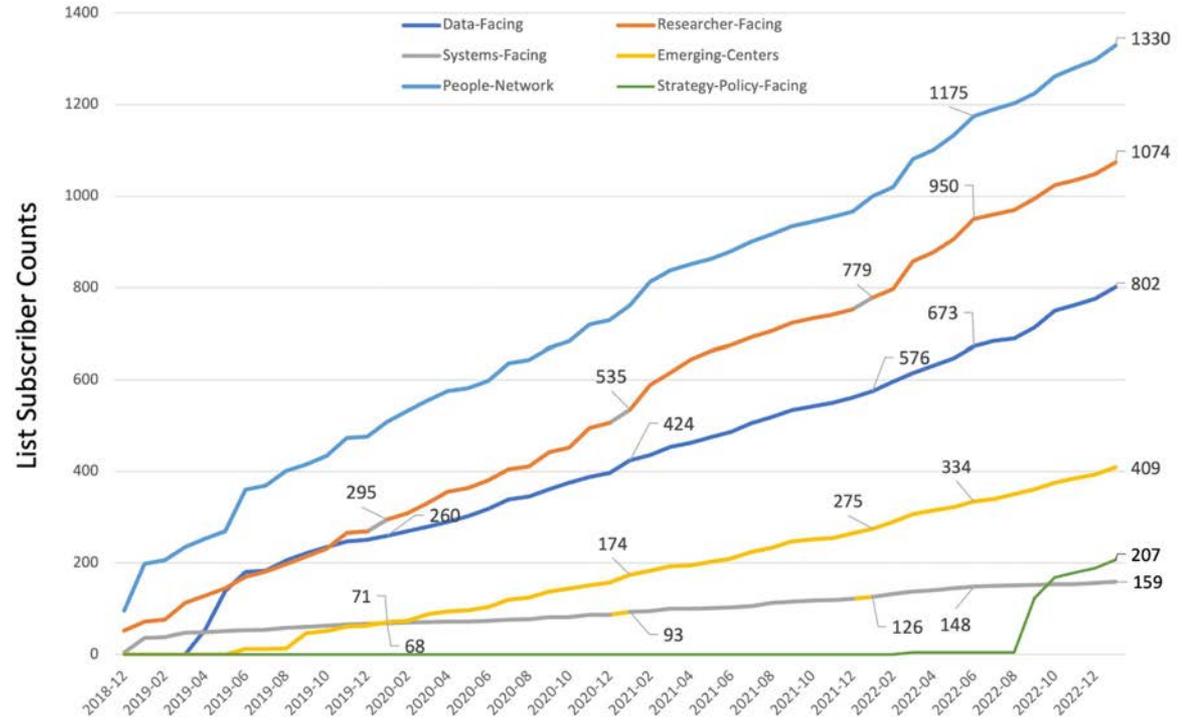


Strategy/Policy-Facing Track:

Topics such as institutional alignment, culture, funding, policy, community

CaRCC is one of the largest and fastest growing organizations of RCD professionals

Timeline of CaRCC Mailing List Memberships



The People Network: Highlights 2022-2023

Externally

- ~1500 Track Call attendees across 28 Track & joint calls
- >6500 YouTube Recordings views across all Track Calls in the past year
- Launch of the Strategy & Policy-Facing Track, and tie-in with Emerging Centers Track
- First Accessibility Month call series: Community discussion, 3 speakers, and feedback/debrief
- Broadening inclusion for Community Calls announcements & accessibility for Track materials
- Continuing to develop and build new collaborations with peer communities.

Internally

- 28 Steering Committee members across all five Tracks
 - Helpful in developing & coordinating topics & presenters, in addition to bringing in new ideas
 - Mentoring potential future Track Chairs.
- More discussion and coordination for cross-track, themed, & plenary calls
- More joint calls to continue to build bridges / break down barriers amount groups & interest areas

Join the mailing list to hear
about more opportunities in
CaRCC and RCD Nexus:



RCD Nexus - Supporting the RCD Workforce to Advance Research

An NSF-supported CI Center of Excellence Pilot

May 2021 - April 2024 (Award 210003)



Dana Brunson, PI - Internet2 - Executive Director for Research Engagement

Scott Yockel, co-PI - Harvard - University Research Computing Officer

Claire Mizumoto, co-PI - UC San Diego - Director, Research IT Services

Thomas Cheatham co-PI - University of Utah - Professor of Pharmacy & Director of RC/CHPC

Patrick Schmitz, co-PI - Semper Cogito

Daphne McCanse, Communications and Engagement Lead

RCD Nexus Pilot: Initial Priorities

- Conduct an RCD Workforce Staffing survey
- Advance the adoption of RCD Job Family Framework
- Develop a Career Arcs resource for RCD professionals
- Curate leading practices for Staff Professional Development
- Curate leading practices for Involving Students in the RCD Workforce
- Develop an Enhanced RCD Capabilities Model Assessment Tool and Community Dataset Portal



CaRCC Working Groups

Activities that connect Research Computing and Data (RCD) professionals & organizations to increase knowledge sharing & enable research innovation

RCD Professionalization

Develop and disseminate frameworks, models, and approaches that can be used by leaders in HR, IT, Research, etc. to support and elevate RCD roles.

RCD Career Arcs

Creates resources to explain RCD career options, help existing RCD professionals explore professional development and advancement, and aid in recruitment.

RCD Capabilities Model

Allows institutions to assess their RCD support, identify potential areas for improvement, and understand how the broader community views RCD support.

Engagement

Coordinate with working groups to increase visibility & participation in CaRCC, esp. with underserved & underrepresented persons and organizations.

Staff & Student Workforce Development

Leveraging a strong community, addressing current need,
and looking to the future

Supporting RCD Professionals

Those doing the job now, and those
aspiring to become an RCD professional.

Supporting Student Programs

Growing the workforce, share successful
student involvement practices

Supporting Institutions

Develop their programs in support of RCD
staff and student workforces

Monthly Virtual Sessions

Alternates between student and staff
focus areas. All are welcome to
participate.

Have you ever wanted to know...?

- How well is my institution supporting computationally- and data-intensive research and how can we get a comprehensive view of our support?
- What is my institution not thinking about or missing that the community has identified as significant?
- How can my institution (and my group) identify potential areas for improvement?

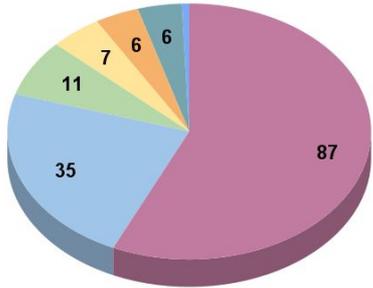
Why is there a RCD Capabilities Model!

- To assess support for computationally- and data-intensive research *with a structured model*
- To identify gaps and potential areas for improvement
- To understand how the broader community views Research Computing and Data support
- To gather baseline data about our community, to inform policy-makers, funders, etc.

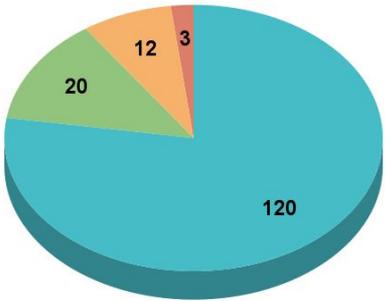
The RCD CM Assessment tool

Area	Questions to consider for: Example University	Help	Deployment at Institution	Multi-Institutional Collaboration	Service Operating Level	Computed Value	Local Priority
Storage Infrastructure						55%	
	Do researchers have access to active data storage services (a.k.a., "scratch" storage, often a parallel filesystem) sufficient for HTC/HPC?		Deployment/support institution-wide - 5	No existing multi-institutional collaboration - 1	Basic/Economy - 4	79%	
	Do researchers have access to sufficient storage to support researchers' data intensive computing needs ?		Deployment/support for parts of the institution - 4	No existing multi-institutional collaboration - 1	Basic/Economy - 4	68%	
	Do researchers have access to mechanisms for isolated and secure support for storage of sensitive/secure data ?		Deployment/support institution-wide - 5	No existing multi-institutional collaboration - 1	Basic/Economy - 4	79%	
	Do researchers have access to policies and technologies that facilitate management and wide access to data ? E.g.: i. Automated tiering and data migration ii. Security/compliance management support for sensitive/controlled data that require special access/export controls		Tracking potential use - 2	Exploring multi-institutional collaboration - 2	Lights on Only - 3	36%	Med Prio
	Do researchers have access to data archival and preservation services (e.g. tape, cloud)?		Deployment/support for parts of the institution - 4	Exploring multi-institutional collaboration - 2	Substantial Risk of Failure(s) - 2	48%	Med Prio
	Do researchers have access to a place to store final research data to address institutional policy and/or funding agency requirements ?		Deployment/support for parts of the institution - 4	Sustaining multi-institutional collaboration - 4	Lights on Only - 3	66%	
	Do researchers have access to support for collaborative data grids and/or data repositories (national-local-commercial: e.g.: OSN, iRODS, etc)?		Tracking potential use - 2	Exploring multi-institutional collaboration - 2	No existing service or support - 1	12%	
Network and Data Movement Infrastructure						71%	
	Do researchers have access to a high-performance network that supports research within campus ?		Deployment/support institution-wide - 5	Sustaining multi-institutional collaboration - 4	Basic/Economy - 4	92%	
	Do researchers have access to a Science DMZ (a means to securely enable high performance inter-campus data flows that bypass campus firewalls)?		Deployment/support institution-wide - 5	Sustaining multi-institutional collaboration - 4	Basic/Economy - 4	92%	
+ ☰ Summary ▾ Researcher Facing ▾ Data Facing ▾ Software Facing ▾ System Facing ▾ Strategy and Policy Facing ▾							

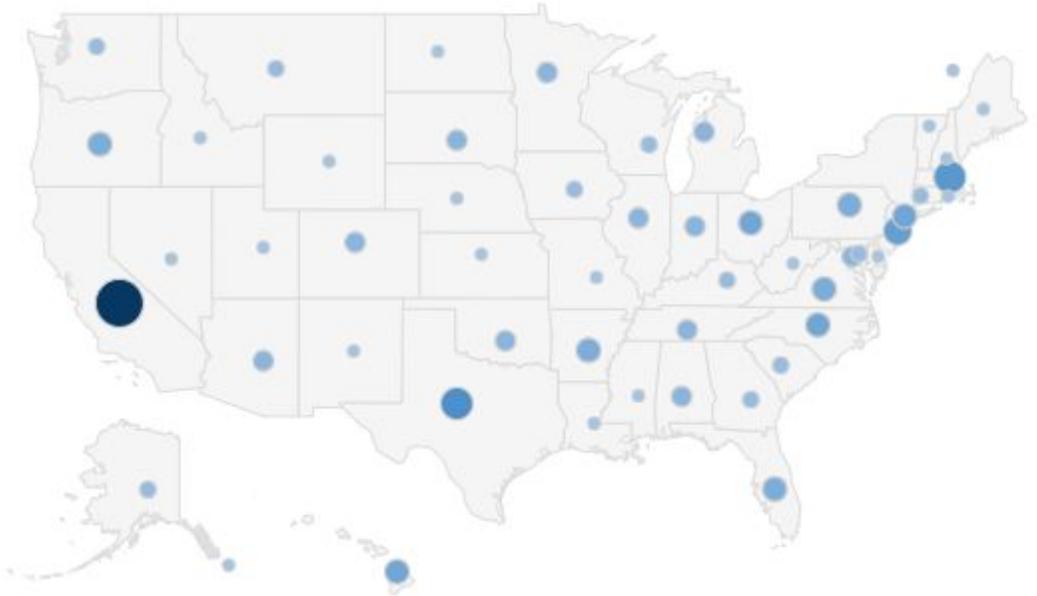
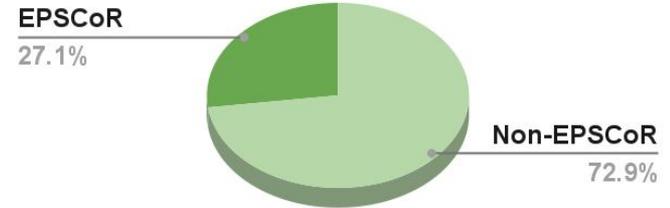
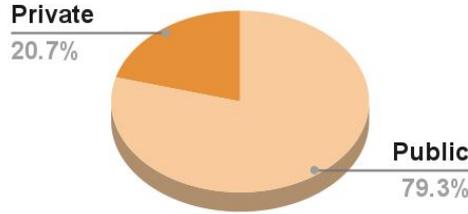
Who is using it?



- R1
- R2
- Other
- Bacc
- D/PU (R3)
- M1
- Assoc



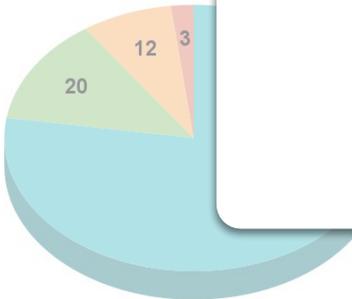
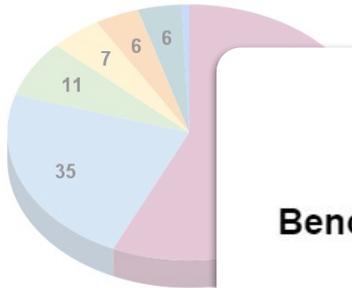
- Not a minority-serving institution
- Hispanic-Serving Institutions (HSI)
- Minority-Serving Institution (MSI)
- Historically or Predominantly Black Colleges and Universities (HBCU/PBI)



155 Unique institutions, as of Feb 2023

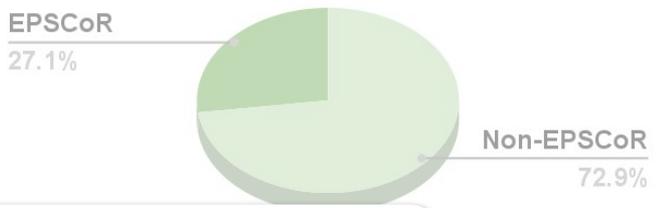
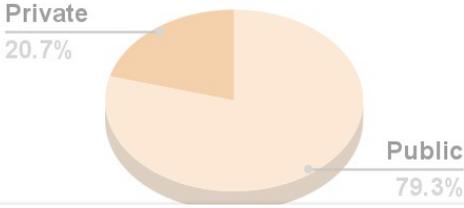


Who is using it?

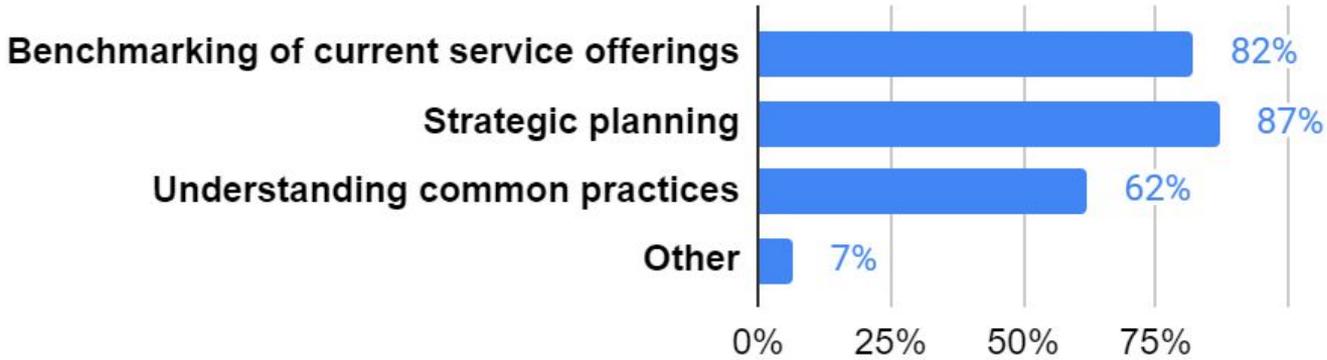


● R1

● Historically or Predominantly Black Colleges and Universities (HBCU/PBI)



Intended Use



160 Unique institutions, as of Dec 2022

RCD Capabilities Model *Focused Tools*

- Define a *new* set of tools for first-step and more focused assessments at smaller and emerging programs
- Developing in engagement with community partners (focus groups, workshops, interviews, etc.)
 - EPSCoR, GPN, NJEdge, I-Light, SOX, and other communities
 - Smaller institutions (non R1/R2) with significant research activity
- Current thinking: two new resources
 - Conversation template/script as first introduction to ideas
 - “Chart your own path” model for quicker/focused assessments



<p>Academic Data Science Alliance Website: https://academicdatascience.org/ Community: Academic Data Science Alliance</p>	<p>Ask Cyberinfrastructure Website: https://ask-ci.org/ Community: Researcher Facing Community</p>	<p>Association of Research Libraries Website: https://arlib.org/ Community: Library Academy</p>	<p>Campus Champions Website: https://campuschampions.org/ Community: Academy Library Community</p>	<p>CaRCC Website: https://carcc.org/ Community: Academy Library Community</p>	<p>CASC Website: https://casc.org/ Community: Academy Library Community</p>	<p>cni Website: https://cni.org/ Community: Academy Library Community</p>	<p>Computational Science H... Website: https://info.hpc.org/awards.html Community: Academy Library Community</p>	<p>CyberAmbassadors Website: https://info.hpc.org/cyberambassadors Community: Academy Library Community</p>	<p>Ecosystem for Research N... Website: https://ecosystem.org/ Community: Academy Library Community</p>	<p>EDUCAUSE Website: https://edUCAUSE.org/ Community: Academy Library Community</p>	<p>EDUCAUSE Website: https://edUCAUSE.org/ Community: Academy Library Community</p>	<p>XSEDE Website: https://www.xse.de/ Community: Academy Library Community</p>
<p>FLR Website: https://www.flr.org/ Community: Academy Library Community</p>	<p>GPN Website: https://www.gpnlab.net/ Community: Academy Library Community</p>	<p>HPC-AI Advisory Council Website: https://www.hpc-ai.org/ Community: Academy Library Community</p>	<p>Internet2 Website: https://www.internet2.edu/ Community: Academy Library Community</p>	<p>LCI Website: https://www.lci.edu/ Community: Academy Library Community</p>	<p>Mid-Atlantic Research In... Website: https://www.marlab.org/ Community: Academy Library Community</p>	<p>Midwest Research Comput... Website: https://midwestresearchcomput.org/ Community: Academy Library Community</p>	<p>Minority Serving - Cyber... Website: https://www.mscc.org/ Community: Academy Library Community</p>	<p>ncds Website: https://www.ncds.org/ Community: Academy Library Community</p>	<p>nysanet Website: https://www.nysanet.org/ Community: Academy Library Community</p>	<p>OneOklahoma CyberInfra... Website: https://www.oneoklahoma.org/ Community: Academy Library Community</p>	<p>Open Researcher and Con... Website: https://orcid.org/ Community: Academy Library Community</p>	<p>Open Science Grid Website: https://www.opensciencegrid.org/ Community: Academy Library Community</p>
<p>PEARC Website: https://www.pearc.org/ Community: Academy Library Community</p>	<p>RCD Community of Comm... Website: https://www.rcdcommunity.org/ Community: Academy Library Community</p>	<p>RCD Nexus Website: https://www.rcdnexus.org/ Community: Academy Library Community</p>	<p>Regulated Research Com... Website: https://www.regulatedresearch.com/ Community: Academy Library Community</p>	<p>Research Computing and ... Website: https://www.researchcomputing.org/ Community: Academy Library Community</p>	<p>Research Computing Team... Website: https://www.researchcomputing.org/ Community: Academy Library Community</p>	<p>Research Data Access & P... Website: https://www.rda.org/ Community: Academy Library Community</p>	<p>Research Data Alliance Website: https://www.rda-alliance.org/ Community: Academy Library Community</p>	<p>Research Software Allian... Website: https://www.researchsoftware.org/ Community: Academy Library Community</p>	<p>Rocky Mountain Advanc... Website: https://www.rmacc.org/ Community: Academy Library Community</p>	<p>SC Conference Series Website: https://www.scconference.org/ Community: Academy Library Community</p>	<p>Science Gateways Commu... Website: https://www.sciencegateways.org/ Community: Academy Library Community</p>	<p>ShowMeC... Website: https://www.showmecc.org/ Community: Academy Library Community</p>
<p>sig hpc Website: https://www.sighpc.org/ Community: Academy Library Community</p>	<p>sig hpc Education Website: https://sighpceducation.org/ Community: Academy Library Community</p>	<p>sig hpc Systems Website: https://sighpcsystems.org/ Community: Academy Library Community</p>	<p>Sunshine State Education... Website: https://www.sse.org/ Community: Academy Library Community</p>	<p>The Carpentries Website: https://www.thecarpentries.org/ Community: Academy Library Community</p>	<p>The Future of Research Co... Website: https://www.forc21.org/ Community: Academy Library Community</p>	<p>The Quilt Website: https://www.thequilt.org/ Community: Academy Library Community</p>	<p>Trusted CI Website: https://www.trustedci.org/ Community: Academy Library Community</p>	<p>United States Research So... Website: https://www.usrise.org/ Community: Academy Library Community</p>	<p>University of Oklahoma W... Website: https://www.uoer.org/ Community: Academy Library Community</p>	<p>Utah Education Network Website: https://www.uen.org/ Community: Academy Library Community</p>	<p>Women in HPC Website: https://www.womeninhpc.org/ Community: Academy Library Community</p>	<p>Workflows Community Website: https://www.workflowscommunity.org/ Community: Academy Library Community</p>

<https://spaces.at.internet2.edu/display/RE/RCD+Ecosystem>





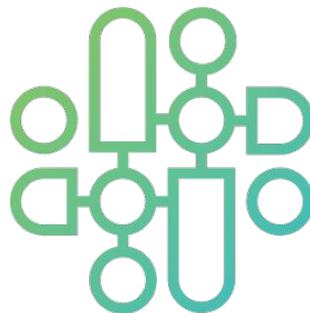
CaRCC

Campus Research Computing Consortium

PEARC 23

COMPUTING FOR THE COMMON GOOD

Portland, OR — July 23–27, 2023



SC23

Denver, CO | *i am hpc.*



INTERNET2 2023 TECHNOLOGY EXCHANGE

Discussion

Research Engagement at Internet2

dbrunson@internet2.edu

jhicks@internet2.edu

tmiddelkoop@internet2.edu



Acknowledgements

Portions of this material are based upon work supported by the National Science Foundation under the following grants:

Grant No. OAC-1440783, “A Model for Advanced Cyberinfrastructure Research and Education Facilitators”

Grant No. OAC-1548562, “XSEDE 2.0: Integrating, Enabling and Enhancing National Cyberinfrastructure with Expanding Community Involvement”

Grant No. OAC-1620695, “RCN: Advancing Research and Education Through a National Network of Campus Cyberinfrastructure, Infrastructures – The CaRC Consortium”

Grant No. OAC-2036534, “Building the research innovation workforce: a workshop to identify new insights and directions to advance the research computing community.”

Grant No. OIA-2033483, 2033514, & 2033519, “Building Research Cyberinfrastructure in EPSCoR Jurisdictions: Assessment, Planning and Partnerships”

Grant No. OAC-2100003, “CI CoE: Demo Pilot: Advancing Research Computing and Data: Strategic Tools, Practices, and Professional Development” (RCD Nexus)