

The Cyberinfrastructure Landscape: Organizations

The Cyberinfrastructure Landscape: Organizations

Mike Renfro^{1,2}

¹Tennessee Tech University

²Campus Champions Leadership Team

2025-06-23

The Cyberinfrastructure Landscape: Organizations

└ Who am I? (Who are any of us, really?)

Who am I? (Who are any of us, really?)

Back in the day

- ▶ ME student at a medium-sized public STEM-ish university who should have studied more instead of helping people do things in computer labs.
- ▶ Sysadmin/CAD/FEA co-op student at Oak Ridge National Lab before SGI Irix got its cameo in "Jurassic Park" ("It's a Unix system: I know this!").



Figure 1: Some skinny nerd, 1990

(Skip this if this is the second of a two-part talk.)

To give you a bit of an idea where I come from in all of this, my LinkedIn bio that has all the fancy language about decades of experience supporting engineering research really comes down to this:

I'm a self-diagnosed high-functioning ADHD guy who probably should have studied more than he helped people in computer labs.

I lucked into a couple of co-op years at Oak Ridge National Lab doing a mix of CAD support, Unix systems administration, and actual engineering.

The Cyberinfrastructure Landscape: Organizations

└ Who am I? (Who are any of us, really?)

Who am I? (Who are any of us, really?)

Now

- ▶ Three ME degrees from the now-R2 university (1995, 1998, 2018)
- ▶ Mostly-solo practitioner of all things RCD at the same university (2000–2017, 2017–)
- ▶ Perpetually online member of multiple RCD organizations (2018–)
- ▶ Member of Campus Champions Leadership Team (2022–), CaRCC Emerging Centers Steering Committee (2024–)
- ▶ Compulsive advice-giver



Figure 2: Same nerd, not remotely skinny, 2023

(Skip this if this is the second of a two-part talk.) That eventually turned into a bunch of degrees from my original university, which I like to call a masters in shaking things and a PhD in breaking things. I stayed on as an R&D engineer in a research center, and then as the first campus-wide HPC systems administrator in central IT. I'm a member of way too many RCD community groups, been on the Campus Champions leadership team for nearly 3 years, on the CaRCC Emerging Centers steering committee for about a year, and I'm a compulsive advice giver and rabbit-hole-chaser.

(Keep this regardless.) So for the folks who don't have a lot of time for the rest of this talk, or for the new folks that may be overwhelmed by RCD, let me go ahead and get you what others have called the starter pack of RCD organizations and conferences where you can find other communities and resources as you need them.

The Cyberinfrastructure Landscape: Organizations

└ The Starter Pack

└ Campus Champions

└ Campus Champions

Campus Champions

- ▶ One of the original RCD communities (2008)
- ▶ Formerly funded by NSF XSEDE program
- ▶ Over 800 members from over 300 institutions in all 50 states
- ▶ Active mailing list for all topics and all RCD roles
- ▶ Monthly Zoom call with planned speaker/topic
- ▶ Monthly Zoom call for any other topics
- ▶ Additional visibility to their institutions' NSF ACCESS usage



The first one is Campus Champions: this was the second RCD community that I joined about 6 years ago, the one that introduced me to Henry and other folks via the Virtual Residency.

Campus Champions is one of the longest-running RCD communities, starting around 2008 and formerly funded by NSF's Extreme Science and Engineering Discovery Environment (XSEDE). It currently has over 800 members from every state, and it includes folks from every RCD role: facilitators, software engineers, systems administrators, etc.

We've got an active mailing list and fairly active Slack, with two regularly-scheduled calls each month. One call has a specific topic and an invited speaker, while the other one is a more free-flowing community chat over any topic of interest to the attendees. Sometimes we start with something hot from the mailing list, other times from recent news items.

One other advantage to Campus Champions is that even though we don't have direct ties to XSEDE's followup project, ACCESS, the ACCESS team does provide Campus Champions extra insight into their institutions' usage of ACCESS resources, which can help you guide your researchers toward more efficient usage or more suitable locations for their work.

The Cyberinfrastructure Landscape: Organizations

└ The Starter Pack

└ Campus Research Computing Consortium (CaRCC)

└ Campus Research Computing Consortium (CaRCC)



Another catch-all group similar to Campus Champions is the Campus Research Computing Consortium, or CaRCC.

CaRCC has a pretty comprehensive structure of tracks, interest groups, and working groups. These are all ad hoc and community driven, and the tracks tend to have one Zoom call per month with a lot of behind the scenes coordination going on.

The biggest thing I'll applaud CaRCC for is their ongoing and invaluable work in professionalization of the RCD field, which helps translate RCD roles into job family matrices that I've used at Tennessee Tech, the RCD Nexus organization that puts together workshops and papers on workforce development and benchmarking your organization against others, and the RCD Capabilities Model to assist with that benchmarking and also with identifying the priorities for improving your organization.

Now those organizations are all virtual, no cost to join, and extremely welcoming and accessible to new folks.

The Cyberinfrastructure Landscape: Organizations

- └ The Starter Pack
- └ PEARC Conference Series
 - └ PEARC Conference Series

PEARC Conference Series

- ▶ The de facto RCD people conference
 - ▶ Small enough (782 attendees in 2023, 970 in 2024)
 - ▶ Full range of publishing options
 - ▶ full papers
 - ▶ posters
 - ▶ posters
 - ▶ visualization showcase
 - ▶ Tutorials/workshops
 - ▶ Birds of a Feather (BoF) sessions
 - ▶ Panel discussions
- Go at least once.



But if you're up for some travel, and don't know where to go to improve your RCD program or yourself, here's a couple more options.

The Association for Computing Machinery hosts an annual Practical Experiences in Advanced Research Computing Conference (PEARC), and this is by far my top priority conference for the last few years. It's the de facto RCD people conference, and with around 1000 people in attendance last year, it's small enough to where you can meet a lot of people doing work similar to you, and not get overwhelmed.

The conference is a normal academic/professional conference with paper and presentation tracks, a poster session, and a visualization showcase where students, faculty, and staff can show off their work and get ideas to take back with them.

There's a day of workshops and tutorials on a huge range of topics, co-located events from CaRCC and RCD Nexus on the Sunday before the actual conference starts, and a great student program.

Go to PEARC at least once, but as I said previously, it's on my hot list every year because of the people that attend.

The Cyberinfrastructure Landscape: Organizations

└ The Starter Pack

└ Supercomputing Conference Series

└ Supercomputing Conference Series

Supercomputing Conference Series

- ▶ The de facto HPC stuff conference
 - ▶ Huge
 - ▶ Like, really huge (14k attendees in 2023, 18k in 2024)
 - ▶ Lots of vendors
 - ▶ Lots of recruiting
 - ▶ Student Cluster Competition
 - ▶ SCinet (local network providing 6.71 Tb/s WAN connectivity in 2023, 8.71 Tb/s in 2024)
- Go at least once, but just once is probably ok, too.



The Supercomputing conference series is probably the most famous conference, and it's pretty far on the other end of the spectrum from PEARC.

It's huge, around 18000 attendees last year. Tons of vendors, giant exhibition space, lots of recruiting for graduate programs, national labs, etc. One of the two Top 500 lists for fastest HPCs each year is always announced at SC.

They host a student cluster competition every year, where teams from all over the world compete to squeeze the most performance out of a limited power budget and get the best performance on a range of computational codes.

The SCinet network is also a technical wonder, last year they strung a lot of miles of cable around the convention center and provided nearly 9 terabits of Internet bandwidth to the attendees and exhibitors.

So far, I've spent only one day in the SC exhibition hall, and haven't yet attended other parts of it. From what I've heard, for some people, going once is enough for the spectacle of everything, but you may find you want to go back repeatedly.

The Cyberinfrastructure Landscape: Organizations

└ The Starter Pack

└ Virtual Residency Program

└ Virtual Residency Program (you're in this photo, we hope you like it)

Virtual Residency Program (you're in this photo, we hope you like it)

- ▶ Henry's already explained what we're doing here
- ▶ (Mike's opinion) best value experience for new RCD professionals, especially for under-resourced institutions or emerging programs

And last but not least on the starter pack is where you're at right now.

I'm eternally grateful to Henry for helping me attend the virtual residency in 2019, because it was and is by far the best value experience for RCD professionals, especially if you're an under-resourced institution or emerging program like I've been for the last several years.

The Cyberinfrastructure Landscape: Organizations

└ The Starter Pack

└ Where to Go from Here?

└ Where to go from here?

Where to go from here?



Figure 3: We have lots more groups (Crajin)



Figure 4: Not why we have lots more groups

Ok, so beyond the starter pack, there's dozens if not hundreds of RCD and RCD-adjacent groups, conferences, etc. that you can get into.

Though there's some overlap among different groups, they all have a little different focus, priorities, and structure.

So how to make sense of them, so you can direct yourself or your coworkers to the right ones?

The Cyberinfrastructure Landscape: Organizations

└ The Starter Pack

└ Where to Go from Here?

└ How to make sense of all these groups?

How to make sense of all these groups?

Campus Research Computing Consortium's [facings](#) (somewhat blurry boundaries, still):

1. Researcher-facing: outreach, advanced application support, co-creating along the research lifecycle
2. Data-facing: data discovery/collection, analysis/visualization, curation, preservation, policy compliance
3. Software-facing: software package management, research software development, optimization
4. Systems-facing: systems administration and operations, networking, architecture, security
5. Strategy- and Policy-facing: leadership, institutional alignment, culture, funding, external partnerships

I'm going to break these groups up by what CaRCC calls facings, the broad categories of work that an RCD professional might be responsible for.

Researcher facing for the folks that work directly with researchers, the trainers, the onboarders, etc. Data-facing for the data collection, management, archival, and related duties. Software facing for software development, profiling, and similar. Systems facing for your systems and network administrators, engineers, and architects. And strategy/policy facing for the folks that deal with leadership roles, institutional alignment, funding, and external partnerships.

The Cyberinfrastructure Landscape: Organizations



Software Carpentry

Since 1998, Software Carpentry has been teaching researchers the computing skills they need to get more done in less time and with less pain. Our [volunteer instructors](#) have run [hundreds of events](#) for more than 34,000 researchers since 2012. All of our [lesson materials](#) are freely reusable under the [Creative Commons - Attribution license](#).
- <https://software-carpentry.org/about/>



From the researcher-facing side, especially for introductory user training, Software Carpentry and its related organizations offer some of the best, most widely-tested, low barrier to entry training materials and instructor training out there.

We've used Software Carpentry materials for everyone from advanced high school students through our research faculty, and going through their instructor training will likely give you new insight into the science of pedagogy and instructional design. Their core curriculum covers the Unix shell, Git for version control, and a couple different options for data processing in both R and Python.

The Cyberinfrastructure Landscape: Organizations

- └ Researcher-Facing
 - └ CyberAmbassadors
 - └ CyberAmbassadors

CyberAmbassadors

- ▶ Originally an NSF workforce development project for R&D professionals
- ▶ Now expanded to include STEM students and professionals from all disciplines
- ▶ Strengthening skills in:
 - ▶ communications
 - ▶ teamwork
 - ▶ leadership
- ▶ PIs inducted into American Society for Engineering Education Hall of Fame in 2023



The CyberAmbassadors program has a few time slots during the virtual residency this year, so I'll let them explain in more detail, but in general, they're a recognized leader in training for more of the soft skills that complement the technical ability you or your coworkers have. They offer workshops in communications, teamwork, and leadership, and in 2023, the PIs were inducted into the ASEE hall of fame for their work in this program.

The Cyberinfrastructure Landscape: Organizations

- └ Data-Facing
 - └ Research Data Access and Preservation Association (RDAP)
 - └ Research Data Access and Preservation Association (RDAP)

[RDAP] supports an engaged community of information professionals committed to creating, maintaining, advancing, and teaching best practices for research data, access, and preservation.

The RDAP community brings together a variety of individuals, including data managers and curators, librarians, archivists, researchers, educators, students, technologists, and data scientists from academic institutions, data centers, funding agencies, and industry who represent a wide range of STEM disciplines, social sciences, and humanities.

→ <https://rdapassociation.org/>



RDAP is geared toward your data facing people, your research librarians, etc.

I'm the child of a less-fancy public-school librarian, and I love being around those kinds of folks.

RDAP finished their annual conference just recently, and the QR code and link there will lead you to their full set of YouTube recordings, posters, slides, and other materials for the entire conference.

You can always trust the librarians to adopt the FAIR principles on all their stuff. Really valuable material that you generally won't get elsewhere in the RCD ecosystem.

The Cyberinfrastructure Landscape: Organizations



Data Carpentry

Data Carpentry develops and teaches workshops on the fundamental data skills needed to conduct research. Our mission is to provide researchers high-quality, domain-specific training covering the full lifecycle of data-driven research.

= <https://datacarpentry.org>
Curricula for: [astronomy](#), [ecology](#), [genomics](#), [geospatial data](#), [image processing](#), [social sciences](#)



Data Carpentry is a sibling organization to Software Carpentry. It focuses on domain-specific training materials in a variety of physical and social sciences, with some overlap with the Software Carpentry materials. But it gets to be more focused on what they cover to match the needs of the specific field.

The Cyberinfrastructure Landscape: Organizations

- └ Data-Facing
 - └ Library Carpentry
 - └ Library Carpentry

Library Carpentry

Library Carpentry focuses on building software and data skills within library and information-related communities. Our goal is to empower people in these roles to use software and data in their own work and to become advocates for and train others in efficient, effective and reproducible data and software practices.

- <https://librarycarpentry.org/about/>



The Cyberinfrastructure Landscape: Organizations

└ Software-Facing

└ US Research Software Engineer Association (US-RSE)

└ US Research Software Engineer Association (US-RSE)

For the software-facing folks, the dominant organization in the US is the US Research Software Engineer Association, or US-RSE.

They're a very inclusive group where not everyone is expected to be a professional software developer, but they're where you want your developers to be. There's so much software out there that's just good enough to get the job done, but not good enough to scale up or out, and US-RSE can help there.

Also, US-RSE and the Academic Data Software Alliance collaborated on a comprehensive career guidebook for data scientists and RSEs that nicely complements some of what CaRCC does with broader RCD professionalization. You'll find a link to that in US-RSE's Resources page.

[US-RSE] is a community-driven effort focused on the increasingly important role of the Research Software Engineer.

- <https://us-rse.org/about/>

We have an evolving definition of [RSEs] to encompass those who regularly use expertise in programming to advance research. This includes researchers who spend a significant amount of time programming, full-time software engineers writing code to solve research problems, and those somewhere in-between. We aspire to apply the skills and practices of software development to research to create more robust, manageable, and sustainable research software.

- <https://us-rse.org/about/what-is-an-rse/>



The Cyberinfrastructure Landscape: Organizations



We are a SIGHPC ACM Chapter focused on the systems staff who stand up high performance systems. This includes system admins, storage admins, networking admins, facilities staff—everyone who participates in the process of physically standing up HPC systems. Our community is focused on sharing solutions and failures associated with these complicated, novel, cutting-edge systems.

= <https://sighpc-syspros.org/>



ACM's SIGHPC Systems Professionals group was the first RCD group I joined around 2018. I was hired into an enterprise systems administration group on account of my systems-facing skills, but even though I'd been running HPCs at smaller scales for several years, SIGHPC SysPros showed me so much more that I could be doing and let me learn from others' mistakes and successes. Demographically, this group is far from diverse, but it's very welcoming and practically unstumpable on deep systems-related questions. They have a BOF and a social event every year at PEARC, and an incredibly active Slack where most of the year-round activity occurs.

The Cyberinfrastructure Landscape: Organizations

└ Systems-Facing

└ Linux Clusters Institute (LCI)

└ Linux Clusters Institute (LCI)

Linux Clusters Institute (LCI)

The Linux Clusters Institute (LCI) is providing education and advanced technical training for the deployment and use of computing clusters to the high performance computing community worldwide.

Founded in 1998, it includes some of the world's foremost experts in building and deploying clustered high-performance computing systems. LCI is the premier international forum to share information on management, administration, and advanced computing techniques for high performance clustered computing.

→ <https://linuxclustersinstitute.org>



I've only attended one Linux Clusters Institute workshop as a last-minute substitute instructor, but it's regarded as some of the best training for your systems-facing people to level up their HPC administration skills. Every time there's a new LCI workshop, I see a new batch of people join SIGHPC SysPros all in a bunch.

The Cyberinfrastructure Landscape: Organizations

└ Strategy- and Policy-Facing

└ Coalition for Academic Scientific Computation (CASC)

└ Coalition for Academic Scientific Computation (CASC)

The mission of CASC is to:

1. Advocate for the importance of and need for public and private investment in research computing and data services to support academic research.
2. Serve as a trusted advisor to federal agencies on the direction of relevant funding programs.
3. Actively engage in discussions of policies related to research computing and data services.
4. Foster advancement of a robust and diverse community of current and emerging leaders in this field.
5. Provide a forum for the community to share strategic ideas and best practices.



The Coalition for Academic Scientific Computation (CASC) is the premier group for the strategy and policy-facing folks in RCD. It has the closest ties to the federal agencies that drive a lot of RCD funding, and communicates the concerns and needs of the RCD community toward those agencies.

There is a membership cost on CASC, unlike most of the rest of the groups I've talked about, and I'll admit their conferences are not my comfort zone due to impostor syndrome. But they fill a unique role in the RCD ecosystem, and I'm grateful they're doing what I can't do as easily.

The Cyberinfrastructure Landscape: Organizations

└ Strategy- and Policy-Facing

└ EDUCAUSE Research Computing and Data Community Group

- └ EDUCAUSE Research Computing and Data Community Group

This community group discusses IT support for institutional research missions. The two broad categories of issues are: IT support for research administration, and IT support for research activities. The former includes pre- and post-award support, interacting with Federal grant systems, regulatory compliance, and intellectual property management. The latter includes centralized vs. decentralized approaches, high performance computing, advanced networking, informatics and enabling multidisciplinary/interdisciplinary/inter-institutional work.



Another externally-facing RCD group is part of EDUCAUSE, which probably everyone's central IT group belongs to, even if you've never heard of them. The RCD community group in EDUCAUSE gets a bit farther afield than other groups in addressing support for the administration of research rather than the research itself, but they've got an interesting niche between RCD groups and more of the enterprise IT folks.

The Cyberinfrastructure Landscape: Organizations

└ Strategy- and Policy-Facing

└ Regulated Research Community of Practice (RRCoP)

└ Regulated Research Community of Practice (RRCoP)

Regulated Research Community of Practice (RRCoP)

The Regulated Research Community of Practice (RRCoP) builds a network of people able to help each other in implementing an affordable but effective cybersecurity and compliance program at academic institutions.

– <https://www.regulatedresearch.org/about>



Finally, the Regulated Research Community of Practice (RRCoP) is the best meeting place for folks working at the intersection of cybersecurity, compliance, and research.

If your institution is just getting into more sensitive research areas, especially Department of Defense areas, RRCoP can be an invaluable sanity check for everyone at your campus. At times, security measures can go overboard in an abundance of caution, risk management, and unknowns, but RRCoP has been extremely helpful in gathering what other more experienced institutions are doing to secure their more regulated data.