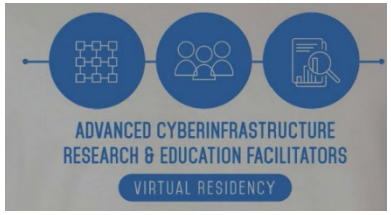


Virtual Residency Introductory Workshop: Overview

Henry Neeman, University of Oklahoma
Director, OU Supercomputing Center for Education & Research (OSCER)
Associate Professor, Gallogly College of Engineering
Adjunct Associate Professor, School of Computer Science
XSEDE Campus Engagement Joint Co-Manager
Virtual Residency Introductory Workshop 2022
Monday June 27 2022

Workshop Webpage & E-mail

- Workshop webpage:

http://www.oscer.ou.edu/virtualresidency2022/

All materials will be posted here, including slides (if any), links to Google Docs for each session, and links to streaming video recordings of the sessions (afterwards).

- Workshop e-mail address:

virtualresidency2022@gmail.com

If you have questions, sending them to this e-mail address means that they'll get auto-forwarded to Henry.

Zoom Videoconferencing

- Zoom is compatible with Windows, MacOS, Linux, iOS and Android.
- If you can't use the Zoom app, you can use your phone for audio-only (but video+audio is better).
- Slides will be posted on the workshop webpage, but we can't guarantee that they'll always be posted before they're used.
- We hope to be able to post streaming video of all sessions after each session, but we don't know how long the lag will be (probably hours, hopefully by the next day: auto-captioned).
- Please **MUTE YOURSELF** except when you're talking.

http://www.oscer.ou.edu/virtualresidency2022/ virtualresidency2022@gmail.com

Zoom: Video+Audio

- **General**
  - You **MUST** have a Zoom account. You can get a **FREE** Zoom Basic account at: http://zoom.us/
  - In your Zoom account, please use either (a) your full name or (b) your first name and institution, for reporting to the NSF.
  - Please **update Zoom** to the most recent stable version.
- **Windows**, **MacOS** or **Linux**:
  - In a web browser, go to the Zoom URL we sent you via e-mail.
  - That will get you a download of the Zoom app for your OS.
- **Android** or **iOS**:
  - Go to your app store and download the FREE Zoom app.
  - Run the Zoom app and go to the meeting ID number in the e-mail.
- Please **MUTE YOURSELF** except when you're talking.

http://www.oscer.ou.edu/virtualresidency2022/ virtualresidency2022@gmail.com

Phone: Audio Only, USA

For audio only via phone, from inside the USA:

- On any USA phone, dial one of the following USA toll numbers:

720-928-9299 US toll (Denver)
971-247-1195 US toll (Portland)
213-338-8477 US toll (Los Angeles)
253-215-8782 US toll (Tacoma)
346-248-7799 US toll (Houston)
602-753-0140 US toll (Phoenix)
669-219-2599 US toll (San Jose)
301-715-8592 US toll (Washington DC)
312-626-6799 US toll (Chicago)
470-250-9358 US toll (Atlanta)
470-381-2552 US toll (Atlanta)
646-518-9805 US toll (New York)
646-876-9923 US toll (New York)
651-372-8299 US toll (Minnesota)
786-635-1003 US toll (Miami)
267-831-0333 US toll (Philadelphia)

Use the session ID number and numeric password in the e-mail.

- Please e-mail hneeman@ou.edu with your name, institution and phone number, so that we can properly track and report how many people attended from each institution.
- **NOTE**: **NO TOLL-FREE** telephone audio-only option for remote attendees inside or outside the USA.
- Please **MUTE YOURSELF** except when you're talking.

http://www.oscer.ou.edu/virtualresidency2022/ virtualresidency2022@gmail.com

Phone: Audio Only, Non-USA

For audio only via phone, from outside the USA:

- Open a web browser and go to:

https://zoom.us/zoomconference?m=GBPzosolPR18D5S7Ig55m6KM95W8UxEF

- Find your country and call that TOLL number (**NO TOLL-FREE**).
- Use the meeting ID and numeric password in the e-mail.
- Please e-mail hneeman@ou.edu with your name, institution and phone number, so that we can properly track and report how many people attended from each institution.
- **NOTE**: **NO TOLL FREE** telephone audio-only option for remote attendees inside or outside the USA.
- Please **MUTE YOURSELF** except when you're talking.

http://www.oscer.ou.edu/virtualresidency2022/ virtualresidency2022@gmail.com

Zoom: Camera Off, Mic Muted

- If you're on Zoom, please keep your **CAMERA OFF EXCEPT** (optionally) when you're asking a question:
  - Some of our attendees have limited bandwidth for Zoom, so having extra movement on the screen may slow down or even crash their Zoom connection.
- If you're on Zoom or on the phone, please keep your **MICROPHONE MUTED** except when asking a question.
- Remember, there are lots of you (hundreds total, typically more than a hundred at a time).
- If you forget to mute your camera and/or microphone, we will mute you.
- If you keep turning those back on unnecessarily, we will kick you off.

Outline

- This is an experiment!
- CI Facilitators
- Virtual Residency Background
- National Science Foundation's Campus Cyberinfrastructure Programs
- Why Enterprise IT Approaches to Training Won't Work for CI Professionals
- Virtual Residency
- Virtual Residency Workshop 2022
- CCIFTD: Certified CI Facilitator Training & Development
- You're Next …

This Is an Experiment!

This is an Experiment!

- Four of this week's sessions, and some of the material in the longstanding sessions, are exciting and new.
- Those of you who are new are the 8th cohort of what has become a national program.
- This means that you're helping us to pioneer a new way of developing the next generation Cyberinfrastructure (CI) workforce.

Only You …

- … can make the Virtual Residency a success.
  - Ask questions – the only dumb questions are the ones you don't ask.
  - Volunteer your ideas and experiences.
  - Ultimately, it's you who will have to be in charge, not us.

http://www.oscer.ou.edu/virtualresidency2022/ virtualresidency2022@gmail.com

This Is So New, We Don't Know How to Teach It

- For the Introductory workshop sessions (2015-17, 2019, 2021-22), we were able to find speakers for most of the topics we covered.
- For Intermediate and Advanced topics, very few of the topics are issues that any of us know enough about to be able to teach to others at the Intermediate or Advanced level.
- So, most of the Intermediate and Advanced sessions are panels – we'll learn from each other!

http://www.oscer.ou.edu/virtualresidency2022/ virtualresidency2022@gmail.com

CI Facilitators

What is a CI Facilitator?

- "Advanced Cyberinfrastructure Research & Education Facilitator" (ACI-REF – term coined by Miron Livny)
- 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 even multiple institutions.
- At some institutions, CI Facilitation is part time; at others, it's full time. Some CI Facilitators are or used to be:
  - faculty (current or former);
  - postdocs (current or former);
  - research staff (current or former);
  - IT professionals, including from Enterprise IT (current or former);
  - graduate or undergraduate students (current or former).

The Five Facings

- Researcher-facing (e.g., CI Facilitator)
- System-facing (e.g., cluster sysadmin)
- Data-facing (e.g., Research Data Librarian)
- Software-facing (e.g., Research Software Engineer)
- Strategy/policy-facing (e.g., institutional CI leader)

What is a CI Facilitator NOT?

- A CI Facilitator is **NOT NECESSARILY** a computer scientist – in fact, many (most?) CI Facilitators come from non-CS disciplines.
- A CI Facilitator is **NOT NECESSARILY** a sysadmin – in fact, many CI Facilitators have little or no system-facing role).
- A CI Facilitator is **NOT NECESSARILY** a current or former researcher – though many are.
- A CI Facilitator is **NOT NECESSARILY** an IT professional – in fact, most CI Facilitators aren't IT professionals, though many are.

What Do CI Facilitators Do? #1

Cyberinfrastructure (CI) Facilitators are CI professionals who work directly with Science, Technology, Engineering and Mathematics (STEM) and non-STEM researchers, scholars (e.g., humanities) and creatives (e.g., arts), to advance the computing-intensive/data-intensive aspects of their research/scholarship/creative activity.

What Do CI Facilitators Do? #2

CI Facilitation amplifies researcher productivity via:

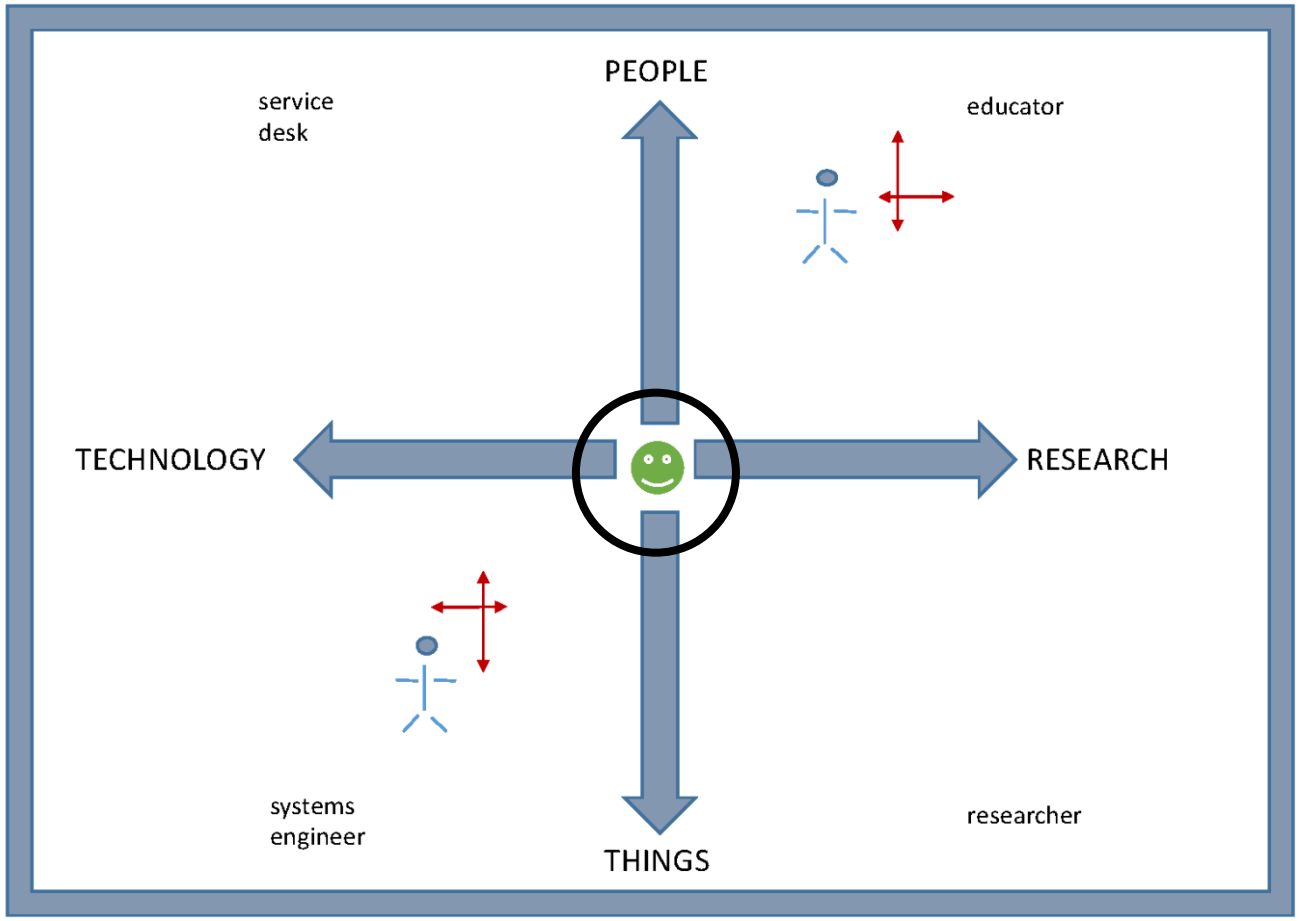
- adapting researcher workflows to CI systems (e.g., supercomputers, clouds, storage) and teaching how to use these systems;
- bridging between researchers and technology experts;
- anticipating new CI needs for emerging research activities (e.g., GPUs for machine learning);
- helping STEM researchers with limited coding experience to design use-case-specific software and to port to advanced architectures;
- teaching research cybersecurity and compliance (e.g., HIPAA for grants);

What Do CI Facilitators Do? #3

CI Facilitation amplifies researcher productivity via (cont'd):

- developing strategies for specific use cases;
- teaching data management;
- providing local and national training opportunities (e.g., Software Carpentry workshops for novice CI skills);
- helping researchers evaluate technology solutions;
- recruiting new users and new use cases;
- researcher advocate to central administration;
- preparing CI-focused portions of publications, posters, etc;
- composing CI text for grant proposals.

CI Facilitators: What Qualities?



Neeman/Cuff 2016

Who Cares About CI Facilitators? #1

- Researchers: They find us incredibly helpful!
- National leadership:

The National Cyberinfrastructure Coordination Service Conference report recommends the following:

"Incentivize the development of new/ongoing efforts that bring together CI professionals to learn from one another and generate community efforts to identify and improve leading practices."

https://www.rti.org/publication/national-cyberinfrastructure-coordination-service-conference

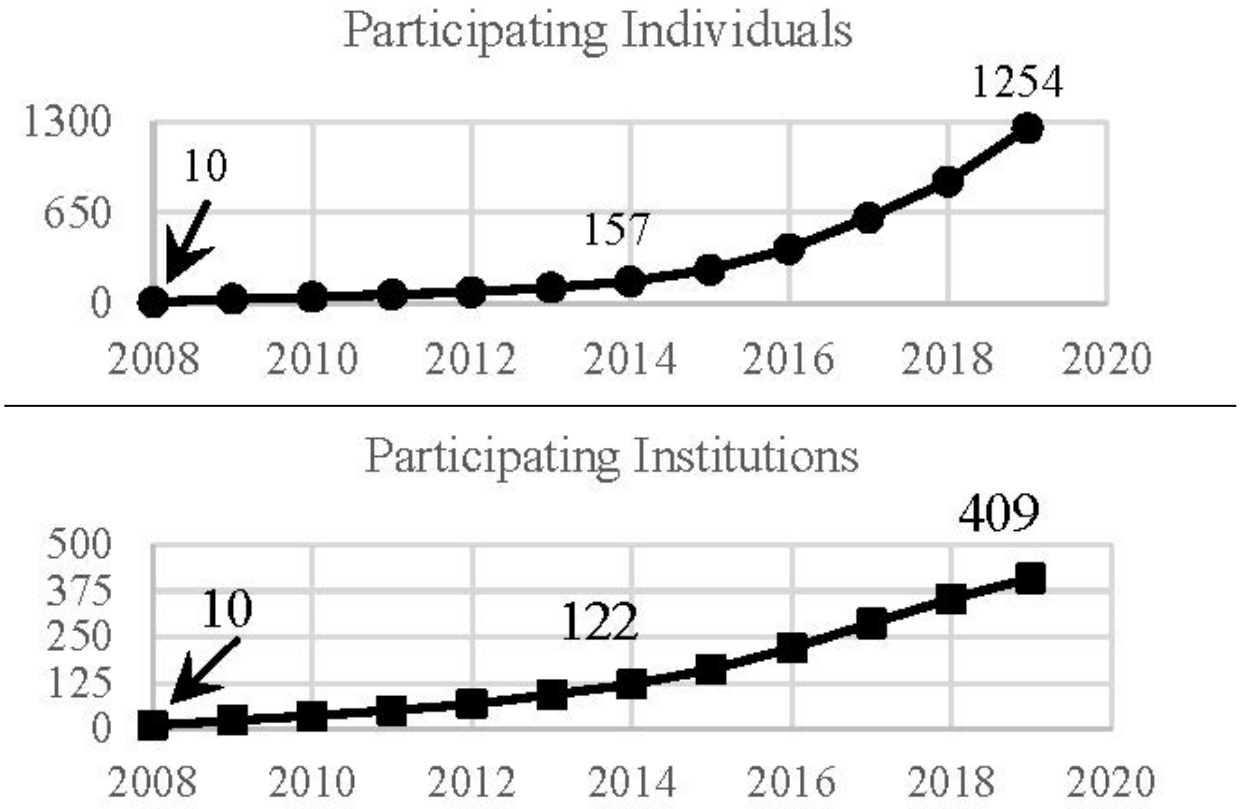
Who Cares About CI Facilitators? #2

Similarly, the National Science Foundation's CI 2030 report states:

- "NSF should develop mechanisms to support teaming of scientists and engineers with ... [CI] professionals to ensure that science and engineering [research] benefits from future advances in ... [CI] ...."
- "The skill and knowledge needed to use ... [CI] is very advanced and beyond the reach of most domain scientists. Professionals with [CI] expertise are in very short supply and there is an increasing need for 'bridge' technologists ... with enough domain expertise to understand research requirements and enough technical [CI] expertise to ... develop/apply the right [CI] solutions. Skills development, reliable funding sources, and rewarding career paths are desperately needed for such individuals."

https://www.nsf.gov/cise/oac/ci2030/

Growth in CI Facilitators

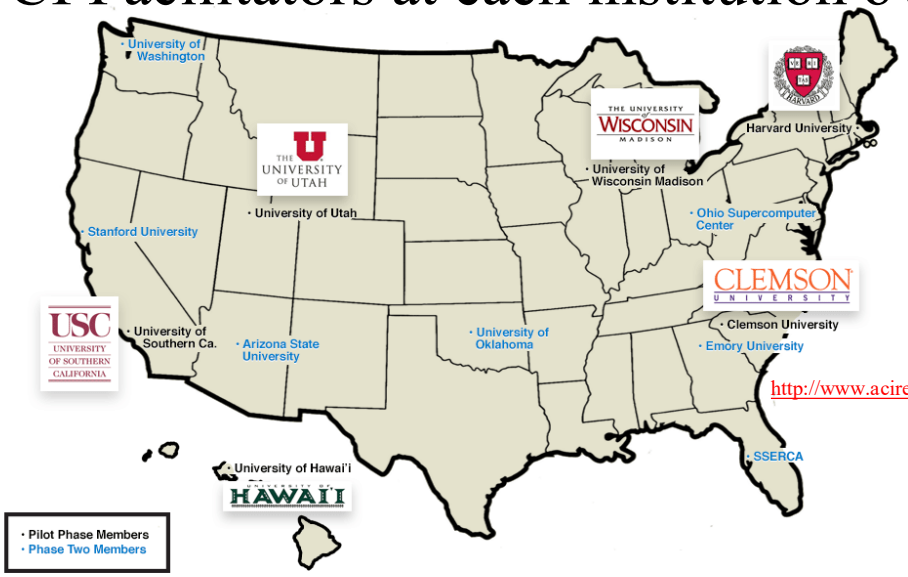


Participating Individuals (top) and Institutions (bottom) in Campus Champions, the Virtual Residency and the CaRCC Researcher-Facing group, 2008-19.

Virtual Residency Background

A Little Background

- In 2013, a team of 13 institutions led by Clemson U submitted an 8-figure proposal on this issue, to provide multiple CI Facilitators at each institution over a 4 year period.



http://www.aciref.org/wp-content/uploads/2014/04/map.png

- The proposal also included funding for advanced networking.

OU's Piece

OU's piece included some extra components:

- A Virtual Residency to teach how to be a CI Facilitator – **THIS**!
- A component about EPSCoR jurisdictions, shared with HI, SC and UT (note that UT has now graduated from EPSCoR):
  - EPSCoR: Established (formerly Experimental) Program for the Stimulation of Competitive Research: a federal program to promote and increase STEM research in states that get less than 0.75% of federal research funding.
    - NSF, Dept of Energy, Dept of Defense, NASA
    - NIH (known as INBRE)

Ah, if only ….

- Unfortunately, the NSF wasn't able to fully fund that proposal. The team ended up reducing down to 6 institutions for 2 years, and no advanced networking.

- "Phase 1:"
  - Clemson U
  - Harvard U
  - U Hawai'i
  - U Southern California
  - U Utah
  - U Wisconsin Madison

- **NOT** in "Phase 1:"
  - Arizona State U
  - Emory U
  - Ohio Supercomputer Center
  - Stanford U
  - Sunshine State Education & Research Computing Alliance (SSERCA)
  - **U Oklahoma**
  - U Washington

National Science Foundation's Campus Cyberinfrastructure Programs

And then …

- In 2012-13, the NSF had a program called "Campus Cyberinfrastructure - Networking Infrastructure & Engineering" (CC-NIE).
  - Two subprograms: One for deploying networking equipment, one for innovative networking research.
  - OU, OSU, Oklahoma Innovation Institute, Langston U, OneNet: "OneOklahoma Friction Free Network"
- In 2014, that was followed by "Campus Cyberinfrastructure - Infrastructure, Innovation & Engineering" (CC*IIE).
  - Several new subprograms, including "Campus CI Engineer."
- Since then, the same program has had various names, but always starting with "Campus Cyberinfrastructure" (CC*).

So …

- In 2014, OU submitted a Campus CI Engineer proposal:
  - "A Model for Advanced Cyberinfrastructure Research and Education Facilitators"
  - $400K
  - Highlighted the relationship between OU and the ACI-REF project.
- We put Clemson's Phase 1 PI on our External Advisory Committee.
- OU was the only institution that was all of:
  - Former ACI-REF Phase 1 (so already involved)
  - EPSCoR (and was to have co-led the ACI-REF EPSCoR thrust)
  - CC* equipment awardee (so needed a Campus CI Engineer already)

Objectives

- Data-Intensive Research Facilitation: Via Software Defined Networking (SDN) across OFFN, facilitate end-to-end management, by researchers, of high bandwidth/high performance data flows through a distributed hierarchy of open standards tools, providing researchers with a new layer of transparency into network transport at OU, among OneOCII institutions, and with ACI-REF members.
- Oklahoma ACI-REF project: Lead and facilitate adoption of the ACI-REF approach across Oklahoma, leveraging extant and emerging capabilities within OneOCII.
- **National training regime: Provide a "virtual residency" program for Campus CI Engineers and other ACI-REFs, open to not only CC*IIE awardees and ACI-REF members but any institution that needs.**
- Research Experiences for Undergraduates (REU) Sites/Supplements: Foster undergraduate research at OU via a culture of integrating REU sites and supplements into Science, Technology, Engineering & Mathematics (STEM) research, including by all research themes on this proposed CC*IIE project.

Success!

Reviewer comments

- "This energetic, detailed and ambitious proposal from the University of Oklahoma deserves the highest priority for support. … There are **no major weaknesses** in the proposal and many strengths. …"
- "The broader impacts are nicely defined in terms of … the idea of a residency program …. A **residency program** and enhancement of undergraduate research are strong enhancements to the proposal. …"
- "This is one of the better proposals regarding … additional outreach via the budgeted **virtual residency program**. …"

[Emphasis added.]

Even More Success!

From a review from the Clemson-led Research Coordination Network grant that created the Campus Research Computing Consortium (CaRCC), regarding broader impacts:

- "The **ACI-REF virtual residency** held at OU Supercomputing Center may be … notable … (the web site's description of the workshop looked outstanding) – assuming it was available to a broader community and not just the [Phase 1] awardees."
  - 2015: 49 of 50 participants (**98%**), from 37 of 38 institutions (**97%**), were "not just the [Phase 1] awardees."
  - 2016: 90 of 99 participants (**91%**), from 60 of 66 institutions (**91%**), were "not just the [Phase 1] awardees."
  - 2017: 186 of 196 participants (**95%**), from 128 of 134 institutions (**96%**), were "not just the [Phase 1] awardees."
  - 2018: 210 of 216 participants (**97%**), from 144 of 147 institutions (**98%**), were "not just the [Phase 1] awardees."
  - 2019: 249 of 254 participants (**98%**), from 161 of 164 institutions (**98%**), were "not just the [Phase 1] awardees."
  - 2020: 400 of 430 participants (**93%**), from 219 of 225 institutions (**97%**), were "not just the [Phase 1] awardees."
  - 2021: 339 of 347 participants (**98%**), from 187 of 191 institutions (**98%**) were "not just the [Phase 1] awardees."

Why Enterprise IT Approaches to Training Won't Work for CI Professionals

Enterprise IT Training Won't Work

- **Enterprise IT**: Millions of professionals
  - 1970: 0.45M (0.6% of US civilian workforce)
  - 2014: 4.6M (2.9%) https://www.census.gov/content/dam/Census/library/publications/2016/acs/acs-35.pdf
    - Compound Annual Growth Rate: 5.3% (doubles every 13 years)
  - Degree programs (AS, BS, MS, PhD, certificates)
  - Certifications (e.g., CISSP, RHCE, MCSE, etc)
  - Enormous resources devoted to constantly updating skills
  - **NOTE**: This **DOESN'T** take into account the explosion of data science degree programs in the late 2010s.
- **Research Computing**: Thousands of professionals
  - No degree programs
  - No certifications
  - Minimal resources for updating skills
  - Therefore, informal education is our best bet – like this!

Virtual Residency

Virtual Residency: What?

- We teach pre-service and in-service CI Facilitators how to do (or do better) Research Computing Facilitation.
- But then we have a hidden secret agenda ….

Virtual Residency: How?

- Annual weeklong summer workshop (since 2015)
  - U California System has run its own targeted workshop based on our introductory workshop, in spring 2017 and spring 2018.
- Virtual Residency workshop planning calls
- Annual meeting at the SC supercomputing conference
- 2017-18, 18-19, 19-20, 20-21: Grant Proposal Writing Apprenticeship (now in hiatus due to getting the grant)
- 2018-19, 19-20, 20-21, 21-22: Paper Writing Apprenticeship (PEARC'19, PEARC'20, PEARC'21 papers published)
- 2021-22: Grant Running Apprenticeship (CCIFTD grant)

Before the Virtual Residency,

no one had ever been dumb enough to try to teach this stuff.

Virtual Residency: Why?

- CI Facilitators have strong experience within their discipline (often non-CS).
- Most CI Facilitators (and other CI pros) haven't been faculty.
- Sometimes little or no research experience (especially for IT staff who have an enterprise IT background).
- Even if strong research background, typically little or no experience with research outside their own discipline.
- When we started the Virtual Residency in 2015, there were no local, regional or national programs to teach people how to be a CI Facilitator.
- In the olden days, you could take your time learning how to do this – but not anymore ….

Virtual Residency: Who?

2015-present (before this week): We've already served 1159 people from 426 institutions in all 50 US states & 4 US territories, plus 14 other countries on 5 continents, including:

- 65 (15%) Minority Serving Institutions (17% of 379 bachelor-granting MSIs, 10% of 654 MSIs);
- 114 (27%) non-PhD-granting institutions;
- 117 institutions (26%) in all 28 EPSCoR jurisdictions;
- 272 institutions (64%) are Campus Champion institutions (77% of Campus Champion institutions).

This is for **ALL** Virtual Residency activities, including:

- workshops (including mini-workshops by/for U California);
- conference calls;
- the Apprenticeships (Grant Proposal Writing, Paper Writing, Grant Running).

Virtual Residency: Who's Here?

We can't yet say who's attending this week's workshop, but we can say who's preregistered:

- 510 preregistrants (2021: 538; 2020: 582; 2019: 334; 2018: 312; 2017: 257)
- 234 preregistered institutions, from 46 US states, 3 US territories and 12 other countries on 6 continents, including:
  - 31 Minority Serving Institutions (13% of this year's institutions),
  - 55 non-PhD-granting institutions (24%),
  - 65 institutions (28%) in 22 of 28 (79%) EPSCoR jurisdictions,
  - 156 Campus Champion institutions (67%).

Based on past experience, we expect far fewer attendees than preregistrants.

Why is Helping Researchers Hard?

- **Ubiquity**: Within any discipline, a greater proportion of researchers do computing-intensive and/or data-intensive research now than ever before.
- **Applicability**: More disciplines do computing-intensive and/or data-intensive research now than ever before.
- **System Complexity**: The storage hierarchy is getting deeper (flash, non-volatile RAM etc), and parallelism is getting more hybrid (GPUs etc).
- **Conceptual Distance**: The mental gap from handheld computing to command line/Linux/batch/remote/shared.

But we still only have one hour to teach them how to use CI before they lose interest!

More Institutions Have On-Premise CI

The fraction of national universities that have on-campus research computing resources:

- 128 of 131 R1s (Carnegie Classification Very High Research Activity);
- 79 of 135 R2s (High Research Activity);
- all of the top 20 institutions (US News rankings);
- all but one of the top 50;
- all but three of the top 100;
- all but 23 of the top 150;
- all but 38 of the top 200.

Most Institutions Have Virtual Residents #1

The fraction of US News national universities that have participated in, or are registered to participate in, the Virtual Residency (percentages due to ties in the last position):

- all but one of the top 10 institutions (91%);
- all but one of the top 25 (96%);
- 51 of the top 50 (94%);
- 72 of the top 75 (92%);
- 89 of the top 100 (87%);
- 129 of the top 150 (80%);
- 151 of the top 200 (76%);
- 179 of the top 250 (68%).

https://www.usnews.com/best-colleges/rankings/national-universities

Most Institutions Have Virtual Residents #2

The fraction of R1 and R2 universities that have participated in, or are registered to participate in, the Virtual Residency:

- R1: 127 of 131 (97%);
- R2: 88 of 135 (65%).

Virtual Residency Evaluation

- For the 2020 workshop, we did an external evaluation of the Virtual Residency workshop.
  - Georgia Tech Institutional Review Board protocol # H16227, approved 6/30/2016, approved for use at OU by OU's IRB 5/13/2022.
- The evaluation was conducted by the same team that does the evaluation for the XSEDE program, led by Lizanne DeStefano and Lorna Rivera.
- We presented a paper with the results of the evaluation at PEARC'21.

Workshop 2020 Demographics

- Gender
  - VRP Women: 30%
    - US Population: 51% (VRP = 59% of US population)
    - All Computing/IT Occupations: 26% (VRP = 115% of CS/IT)
    - SC15-17: 13-14% (VRP = 200+% of recent SC conferences)
- Race/Ethnicity
  - VRP Underrepresented Minorities: 21%
    - US Population: 34% (VRP = 62% of US population)
    - All Computing/IT Occupations: 10% (VRP = 200+% of CS/IT)

https://www.census.gov/quickfacts/fact/table/US/PST045219
https://www.bls.gov/cps/cpsaat11.htm
http://sc16.supercomputing.org/diversity/index.html
https://sc20.supercomputing.org/attend/inclusivity/demographics/

Does the Virtual Residency Work? #1

- The XSEDE evaluation team (Lorna Rivera, Lizanne DeStefano) have done an evaluation of the 2020 workshop.
- Sessions were rated 3.90 - 4.42 on a 1 - 5 scale.
- Effect on underrepresented populations
  - **Underrepresented Minorities**
    - **Experience**: Underrepresented minorities rated their experience as 5% **MORE SUCCESSFUL** than non-URMs rated it (4.76 vs 4.52).
    - **Sessions**: Underrepresented minorities rated 2 sessions 12% **HIGHER** than non-URMs rated them (4.71 vs 4.20, 4.71 vs 4.19).
    - **Google Docs**: Underrepresented minorities rated the Google Docs 13% **MORE USEFUL** than non-URMs rated them (4.58 vs 4.07)
    - No other statistically significant differences found.
  - **Women**
    - **Sessions**: Women rated 1 session 10% **LOWER** than men (3.85 vs 4.27).
    - No other statistically significant differences found.

Does the Virtual Residency Work? #2

- We assume that y'all are plenty busy with other things, so you'd only bother to show up if this were worthwhile.
- As of yesterday (Sun June 26):
  - 338 of 426 Virtual Residency institutions (79%) had participated in multiple Virtual Residency activities;
  - 278 of 426 Virtual Residency institutions (65%) had participated in multiple types of Virtual Residency activities.

The CI Professional Ecosystem

- **Campus Champions**
- Campus Research Computing Consortium (CaRCC)
- Coalition for Academic Scientific Computation
- CyberAmbassadors
- Linux Clusters Institute
- SIGHPC Education Chapter
- The Carpentries
- Science Gateways Community Institute
- UK Research Software Engineer Association
- US Research Software Engineer Association
- US Research Software Sustainability Institute

JOIN THESE!

Ask us for contact info!

Virtual Residency Workshop 2022

2022 Intro Workshop Agenda

Mon June 27 2022

- **Talk:** Virtual Residency Intro Workshop 2022 Overview
- **Talk:** Effective Communication
- **Talk:** Faculty: Tenure, Promotion, Reward System
- **Talk:** CI User Support

Tue June 28 2010

- **Talk**: The CI Landscape: Systems, Service Providers, Technologies
- **Talk/Demonstration:** How to Do an Intake Interview / Intake Interview Demonstrations
- **Talk:** Components and Design of an HPC Cluster
- **Talk:** Research Networking Overview

2022 Intro Workshop Agenda

Wed June 29 2022

- **Talk:** CyberAmbassadors: Let's Talk: Communicating That There's a Problem
- **Panel:** Researcher Perspectives: What Do Researchers Need from CI Facilitators?
- **Talk/Practicum:** How to Do an Intake Interview / Intake Interviews with Real Researchers
- **Talk:** Deploying Community Codes
- **Talk:** Debugging & Tuning

Thu June 30 2022

- **Talk:** The CI Landscape: Organizations
- **Talk:** CyberAmbassadors: Leading the Change: Equity and Inclusion; Leading with Principles: Ethics
- **Panel:** CI Organization Leader Perspectives: What Do CI Organizations Need from Their CI Facilitators?
- **Panel:** Working Effectively with Systems-Facing Professionals

2022 Intro Workshop Agenda

Fri July 1 2022

- **Talk:** Research Data Mgmt
- **Roundtable:**
  Stories from the Trenches

Agenda

- You can get a copy of the agenda in your web browser:

http://www.oscer.ou.edu/virtualresidency2022.php#agenda

32 Presenters from 23 Institutions

1. David Akin, U Oklahoma
2. Catalina Amuedo-Dorantes, U California Merced
3. Carl Boettiger, U California Berkeley
4. Phil Bording, Alabama A&M U
5. Keith Brewster, U Oklahoma
6. Kevin Brandt, South Dakota State U
7. Dana Brunson, Internet2
8. Sarvani Chadalapaka, U California Merced
9. Wallace Chase, U Otago
10. Dirk Colbry, Michigan State U
11. Jacob Fosso Tande, U North Carolina Greensboro
12. Sandra Gesing, U Notre Dame
13. Josh Gyllinsky, U Rhode Island
14. Curt Hilegas, Princeton U
15. Kyle Hutson, Kansas State U
16. Andrew Keen, Michigan State U
17. Damir Krstic, Northwestern U
18. Jihong Ma, U Vermont
19. Prasad Maddumage, Florida State U
20. Bruce Mason, U Oklahoma
21. Sai Medury, Vanderbilt U
22. Timothy Middelkoop, Internet2
23. Henry Neeman, U Oklahoma
24. Arman Pazouki, Northwestern U
25. Jerry Perez, U Texas Dallas
26. Dylan Perkins, U Colorado Boulder
27. JP Pervez, U Texas Dallas
28. Annelie Rugg, U California Los Angeles
29. Himanshu Sharma, U Illinois Chicago
30. Jason Simms, Lafayette College
31. Lisa Snyder, U California Los Angeles
32. Jason Wells, Harvard U

How Did We Pick the Speakers/Panelists?

- The biggest complaint from previous years was that we had the same few presenters over and over.
- We wheedled and begged and pleaded until we got enough presenters for each session, with few repeaters.
- This included repeated pester e-mails to all Virtual Residents.

What Are We Here to Accomplish?

- Learn how to work with researchers who are using CI.
  - Learn how to find them.
  - Learn how to help them.
- Learn how to be institutional CI leaders.
- Start thinking about becoming national CI leaders.

What Aren't, and Are, We Trying to Do?

- We **AREN'T** trying to teach you a lot of ~~technical content~~.
  - You can learn that from other sources.
- We **ARE** trying to teach you the **PROFESSION** of CI facilitation and CI leadership.

What's Our Hidden Secret Agenda?

- The real goal is to prepare for an upcoming transition to:
  - more need for this kind of skilled workforce, but
  - fewer people who know how to do it, with
  - no mechanism to prepare a sufficiently large cohort.
- Some of the participants already knew how to do this.
  - But it took a very long time to learn on their own.
  - To keep up with demand, the community needs us to streamline the process so that new facilitators can become fully productive quickly.
- These are the CI leaders of tomorrow.

CCIFTD:

Certified CI Facilitator Training & Development

NSF CyberTraining Grant

"CyberTraining: Pilot: A Professional Development and Certification Program for Cyberinfrastructure Facilitators"
NSF OAC-2118193
$299,993
9/1/2021 - 8/31/2023
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Professional Development Certification

"Certification: A process, often voluntary, by which individuals who have demonstrated a level of expertise in the profession are identified to the public and other stakeholders by a third party."

https://www.gisci.org/Applicants/AbouttheProgram.aspx

What is CCIFTD?

- Certified Cyberinfrastructure Facilitator Training and Development (CCIFTD, pronounced "sifted").
  - 3rd link on Google!
  - **NOT THIS**: "Canadian Centre for International Fisheries Training and Development"
- First-of-its-kind, **non-matriculated** certification of professional development (**informal education**).
  - **NOT** a matriculated graduate/undergraduate certificate
  - **NOT** a certificate of participation – exams!
- **Badges**: training module, exam, scoring rubric
- **Certification** comes from specific collections of badges.

Why Not a Degree or Grad Certificate?

- We expect a few thousand CI Facilitators:
  not enough to justify creating a degree or certificate program
  at any of the 131 R1s or 135 R2s.
- Most people have never heard of CI Facilitation, so
  even if there were a degree program, uptake would be low.
  - **Unhappy example**: Texas State Technical College had
    an HPC sysadmin Associates degree for a few years,
    but no one knew what HPC was, so they switched it to Cloud,
    because people have heard of Cloud – and even that's gone now.

Objectives

- **From the perspective of CI Facilitators**:
  - Provide both training and proof of mastery in skills that are mission critical to CI Facilitation.
  - Cultivate and expand the CI Facilitators community.
- **From the perspective of CI centers**:
  Increase uptake of CI Facilitation services, and therefore of CI.
- **From the perspective of STEM researchers**:
  Increase computing/data-intensive STEM research productivity, by applying CI expertise that many STEM researchers lack.

Method

1. **Determine the skills** that are most valuable for CI Facilitation, by surveying (i) experienced CI Facilitators, (ii) CI organization directors and (iii) STEM researchers who use CI.
2. **Develop**, for each such skill, (a) a training mechanism, (b) an examination instrument and (c) a scoring rubric, via (i) pilot testing at Virtual Residency workshops and (ii) online resources.
3. **Construct certification pathways** – subsets of badges that, collectively, merit certification.
4. **Test badging methods**, leveraging Virtual Residency Program workshops and online materials.
5. **Evaluate** the success of the CCIFTD program, both formatively and summatively.

Challenges for Certification

1. What **skills** do CI Facilitators need?
2. How do CI Facilitators build **credibility** with their researchers and institutions?
3. How can we **train enough CI Facilitators** to be able to meet this burgeoning national need?
4. How confident can we be that our approach to preparing CI Facilitators is **effective**?
5. How do we **sustain** this approach beyond the near term?

NOT COVERED by this Pilot Project:

6. How do we expand to multiple levels of certification?
7. How do we expand to meet the much larger needs of industry?

You're Next …

http://freapp.us/apps/android/com.im.uncle.sam/

Why Be an Institutional CI Leader?

- Good, warmhearted, virtuous reasons:
  - You have good ideas based on experience and observation, which if implemented would tremendously help your institution's researchers!
  - You love helping researchers use computing to improve their research! (If you didn't, you never would have taken this job.)
  - You know that your administration needs help understanding research computing, and you're great at that!
- Wicked, selfish, mercenary reasons:
  - Better pay.
  - Higher job security.
    - These are because, at any institution, the fraction of employees who are willing to be a grownup is always low.

Why Be a National CI Leader?

- Good, warmhearted, virtuous reasons:
  - The national community would benefit from your keen insights!
  - You'll have a chance to influence the course of research history!
- Wicked, selfish, mercenary reasons:
  - Getting noticed by other national leaders will advance your career.

The CI Professional Ecosystem

- **Campus Champions**
- Campus Research Computing Consortium (CaRCC)
- Coalition for Academic Scientific Computation
- CyberAmbassadors
- Linux Clusters Institute
- SIGHPC Education Chapter
- The Carpentries
- Science Gateways Community Institute
- UK Society of Research Software Engineering
- US Research Software Engineer Association
- US Research Software Sustainability Institute
- Virtual Residency

JOIN THESE!

Ask us for contact info!

Imposter Syndrome?

- Do you ever feel like an imposter, and worry that someone is going to find out that you really don't know what you're doing?
- If so, good, that makes you normal.
  - (Me too.)

Ways You Can Make Your Mark

1. Invent good things.

2. Make good things better.

Ways You Can Make Your Mark

1. Invent good things – Henry examples:
   a. Supercomputing in Plain English
   b. OneOklahoma Cyberinfrastructure Initiative (OneOCII)
   c. PetaStore/OURRstore business model
   d. Virtual Residency
      i. Grant Proposal Writing Apprenticeship
      ii. Paper Writing Apprenticeship
      iii. Grant Running Apprenticeship
   e. CI Leadership Academy
2. Make good things better – Henry examples:
   a. National Computational Science Institute's Parallel Computing workshops
   b. SC Education Program
   c. Campus Champions (much more Dana & leadership than me)

A Growing Need, a Growing Breed

- The Coalition for Academic Scientific Computation (CASC) is a group of many of the mid-to-large academic and government CI centers in the US.
- When OU joined CASC in 2004, there were roughly 35 member institutions.
- Now there are 98.
- So the growth has been significant.
- But, there are a total of 266 R1 and R2 institutions.
- So the growth potential is substantial.

Get Ready to Be in Charge

- Baby Boomers: born 1946-1964 (ages 57-75)
- Generation X: 1965-1980 (ages 41-56)
- Millennials: 1981-96 (ages 25-40)
- Generation Z: 1997-2012 (ages 9-24)
- Generation Alpha: 2013-2022 (ages 0-8)

https://en.wikipedia.org/wiki/Generation_Z

"... [E]very day for the next 19 years, 10,000 baby boomers will reach age 65 ...." – Pew Research Center, 2010

http://www.pewresearch.org/daily-number/baby-boomers-retire/

Who do you think is going to have to take up the mantle they're currently carrying?

Why This is the Best Job Ever

Every day, you get to see how the work you do helps other people to be successful.

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Purple bold = Paper Writing Apprenticeship

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Thanks for your attention!

Questions?

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