CaRCC RCN Annual Report to NSF

Submitted 2020-07-28

https://www.nsf.gov/awardsearch/showAward?AWD_ID=1620695

Accomplishments

What are the major goals of the project?

The project has five main objectives during the NSF funding period:

Objective 1: Develop and adopt a sustainable and representative governance structure from community stakeholders, including a set of operating principles and by-laws.

Objective 2: Implement an operating model and a permanent (elected) leadership team to lead the CaRC Consortium during and after the NSF funding period and be accountable for accomplishing the set mission, vision, and objectives.

Objective 3: Develop a financial and membership model through community input to ensure the sustainability of the CaRC Consortium during and after the NSF funding period.

Objective 4: Adopt a strategic plan to address current gaps in the cyberinfrastructure environment – especially in the area of expertise and knowledge sharing across campuses and organizations, and engage in partnerships that aid in advancing campus research using campus, regional, and national cyberinfrastructure suited to accelerate research.

Objective 5: Expand the membership base of the CaRC Consortium to include all interested campuses and organizations – with a keen focus on diversity of representation and engagement with current CI initiatives and projects, such as the CC*NIE/IIE/DNI program, XSEDE, NSF Cloud projects the Quilt, and commercial cloud providers.

Major Activities

What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?

(4 categories: Specific Objectives, Significant Results, Key Outcomes, Other Accomplishments)

Specific Objectives:

The Campus Research Computing Consortium (CaRCC, https://carcc.org) continues to make progress towards the RCN goals and beyond. Some of the working groups have essentially completed their deliverables (for example **Stakeholders and Value Propositions**) whereas new CaRCC working groups and new tracks in the **People Network** have emerged. New leaders have also emerged and we have successfully transitioned some of leadership in or out

in a smooth and seamless manner. Additionally, over this reporting period, new products have emerged from the various activities (see https://carcc.org/products) including version 1.0 of the Capabilities Model, a peer-reviewed publication about the Capabilities Model, a peer-reviewed publication about the RCD Ecosystem and results from the RCD Ecosystem workshop, an HR Job Family Matrix for RCD Professionals, a RCD Professionals Job Elements and Career Guide, and also the results for the initial CaRCC survey were published. In addition to the products, as is highlighted in greater detail later in this report, participation in CaRCC activities continues to grow with more than 750 members in the **People Network** and 2135 connections to track calls during the reporting period.

To help frame and guide CaRCC activities, we have held yearly 1+ day in-person "re-sync" retreats of leadership, friends, and collaborators. The most recent occurred during October 2019 with a major focus on paths towards sustainability. The retreat helped us redirect and refocus efforts in some of our working groups and led to the creation of some newer working and interest groups including **Engagement, Decadal Survey, Funding and Sponsorship** and planning for the **emerging-centers** and **stakeholder-leadership** (led by the EDUCAUSE research computing and data community group in collaboration with CaRCC and CASC) as partners.

Perhaps one of the greatest accomplishments to come out of the retreat was the collective realization that the original CaRCC charter outlining the structure and governance really did not apply anymore with respect to how CaRCC operates. This led to the formation of an ad hoc **Charter committee** that is converging to an agile and conclusive description of CaRCC activities, leadership, and governance. CaRCC is a primarily volunteer organization that advocates for - and supports - RCD professionals. Its activities center around the **People Network** for engagement between community-members; various Working, Interest, and Activity groups; and focused planning workshops, all of which leverage shared logistical support (see the **Logistics** Group). We regularly collaborate with partner organizations in the RCD community to advance common values and goals with shared credit and ownership among partners.

Leadership and Governance: There are various sub-groups leading activities that help CaRCC function effectively, and each has a partial voice in CaRCC decisions and responsibility for governance within their group. There is also an effective hierarchy and guidance that occurs between the various sub-groups. These leadership groups presently include:

- **CaRCC Chair** (formerly CaRCC Council Chair) - The CaRCC Chair leadership position helps coordinate the CaRCC activities along with the Logistics Group, the Chairs Leadership Team, and the PIs of CaRCC Grant Awards. The Chair can sign letters of collaboration or support on behalf of CaRCC.
- **Chairs Leadership Team** - This group includes, at present, the CaRCC Chair, the Logistics Group, all Chairs of the Working Groups, and the People Network Coordinators and Track Coordinators. At the discretion of the Leadership Team, this may also include Chairs of the

Interest Groups. At their personal option, the PIs of the RCN can also join any of the CaRCC meetings, including the Chairs Leadership Team meetings.

- **PIs of CaRCC Grant Awards** - The Principal Investigators operate currently in an advisory role, although they control the NSF RCN grant finances, at least through the conclusion of any active awards.
- **CaRCC Advisory Committee** [not yet operational] - This is envisioned as a broader community of visionaries and volunteers in the RCD community that advise regarding the research computing and data communities activities and influence.

CaRCC Principles - Inclusive, transparent, trustworthy, collaborative, consensus-driven:
The general philosophy of CaRCC is to be inclusive and transparent with a consensus model of governance. As the People Network has both active and inactive (or non-participating) members, CaRCC as a whole is not sufficiently agile to act as a governing body, but instead serves in an advisory capacity. At present the "Leadership Team" that serves as the governing body is the collective of the PIs, Chair, Logistics Group, and Chairs Leadership Team (Working Group Chairs and People Network Coordinators and Track Coordinators). However, within a given Working, Interest, or Activity Group, the respective Chairs have authority for governance over their own activities. The Chairs Leadership Team may provide oversight and serve to help coordinate activities, communicate, and boundary-span among the various Groups. This is also true of the various Tracks, where Track Coordinators (generally in consensus with the People Network Coordinators) have local authority and autonomy for governance of their activities. It is not the intent of Leadership to override or otherwise control activities of the Groups or Tracks. Another way to state this is that CaRCC does not control or own the Groups and Tracks. For example, the Researcher-Facing Track community owns the Researcher-Facing Track, and the community decides their activities and fate, with guidance from the Track Coordinators, the People Network Coordinators, and potentially others from the Chairs Leadership Team, should they seek council. The leadership team sets standards for activities in the interest of facilitating a functional and effective community and there are written expectations for Chairs and Track coordinators and guidelines on remaining in good standing.

The People Network

As a community of research computing and data professionals, the "People Network" aims to foster, build and grow an inclusive forum for networking and sharing experiences (termed the "People Network"). Leveraging logistical support coordinated via CaRCC, this community executes synchronous and asynchronous opportunities to leverage collective and individual expertise, with focused discussion "tracks" reflective of professional activities (following the facings model described here: https://carcc.org/rcd-professionalization/facings/), akin to an ongoing virtual conference. Each track has its own email list, monthly community calls, and coordinators, whose role is to facilitate the ability of each track and the entire community to organize itself.

Ongoing Working Groups

Ecosystem: The Ecosystem working group began in the fall of 2018 as the Ecosystem Workshop Planning working group. Following the productive April 2019 Ecosystem workshop and subsequent plenary panel at PEARC19, the working group expanded to include all interested workshop participants and others to develop plans for future work resulting in a paper submitted and accepted at PEARC20. With the completion of these deliverables, it has transitioned to an Interest Group to support ongoing discussion.

RCD Capabilities Model: This model and an associated assessment tool allows institutions to assess their support for computationally- and data-intensive research via a series of questions across the various facings (i.e. researcher-facing, systems-facing, etc). This helps institutions identify gaps in their support and potential areas for improvement. It also can inform stakeholders (such as leadership or the libraries) about the broad needs and requirements of research computing and data in support of research and researchers. As data is aggregated across institutions, we will gain insight into support levels across the community, and provide a baseline for institutions to benchmark against peers.

RCD Professionalization: This working group created an HR Job Family Matrix specifically for RCD Professionals that can be used by institutions to properly classify RCD Professional roles. The WG will further disseminate and develop new frameworks and approaches to guide conversations between Human Resources leaders and Research Computing and Data leaders around attracting, retaining, diversifying, and developing research computing and data and cyberinfrastructure talent. Current plans include an RCD Professionals Census, and documenting Career Arcs into and among RCD professional roles.

New Working Groups

Engagement: A team of individuals working to increase the visibility of and participation in CaRCC's community-driven activities, especially to organizations and individuals that are underrepresented.

Interest Groups

CaRCC supports interest groups, whose members and discussions may grow into working groups with specific deliverables and timelines, and/or that have emerged from a working group (e.g., to sustain and support completed deliverables).

Decadal Survey: This group aims to develop a decadal survey (akin to what has been done in astronomy and other fields) for research computing and data, and to distribute this to the broader community to inform and guide joint efforts.

Funding and Sponsorship: This group aims to identify opportunities for private or foundational support for CaRCC's operating costs.

Stakeholders and Value Proposition: This prior working group documented the value of collective buy-in and collaboration to advance the field of research computing and data.

Logistics Group

The Logistics Group carries out ongoing activity that sets standards for and coordinates logistical aspects in support of CaRCC activities, including coordination of CaRCC-associated meetings and workshops, maintenance/improvements to common infrastructure (e.g. website and other outward communication mechanisms, internal documentation, logos, etc.), and liaising connections across various CaRCC activities and groups.

Significant Results:

Charter

The evolving CaRCC Charter is already an improvement over the previous Charter and will be finalized during the next period of the RCN award. (See previous.)

Expansion of the People Network

Significant work within the People Network has resulted in increased impact, inclusivity, and engagement opportunities reaching across the ecosystem of RCD professionals, including growth in participation, new tracks, and new collaborations with other community-building efforts. Early in the reporting period, a new "Emerging Centers" track was launched for professionals working at smaller, under-resourced, and/or newer RCD services providers (reinvigorating previous efforts around "small HPC"). As of July 2020, the primary email list for the People Network includes more than 750 unique subscriptions from at least 225 email domains (191 of which are academic institutions). As intended for the 'track' concept, there is significant overlap in track memberships (e.g. nearly all Emerging Centers members are a member of another track, 64% of Data-Facing members are also members of the Researcher-Facing track, etc.). Thus, track memberships are as follows: 390 Data-Facing, 121 Emerging Centers, 459 Researcher-Facing, 316 Systems-Facing. From 2019-07-01 to 2020-07-01, there were 1667 total sign-ins to track calls from 183 email domains (as self-reported in documents for each call) and 2135 connections counted via Zoom statistics. At least 41% of signed-in participants have signed in to three or more calls during the reporting period. Youtube videos of call recordings (27 total) have been viewed more than 1600 times.

Work toward inclusivity has included the development of a Code of Conduct, requested and produced by network members from across tracks, and later adopted by CaRCC leadership to apply across CaRCC activities (and posted prominently on the CaRCC website); it includes stated priorities for inclusivity and diversity, descriptions of appropriate behavior, and processes for addressing inappropriate behavior. Coordination with other professional networks led to their inclusion in email announcements of People Network community engagement opportunities;

these include the Campus Champions, the CI Engineers list (coordinated by ESNet), Internet2's NRP Engagement group, and the Virtual Residency Program email list. These email announcements specifically mention that membership on a People Network email list is not required for participation in calls, and that all members of the broader RCD community are welcome. Participation barriers have been further lowered by the recording of many track calls, with posting of videos through a CaRCC Youtube channel and public call-notes maintained within CaRCC Google Docs. Recent coordination with EDUCAUSE's Research Computing and Data community has stirred initial plans for launching the intended "Stakeholder-Facing" track for RCD leaders, as a collaborative effort likely to include additional networks such as CASC.

Additional improvements to People Network operations have included documentation of processes for track coordination logistics, call execution, and call facilitators (as most calls are facilitated by volunteer community members, rather than by the coordinators). Some of this work was facilitated by the implementation of a "steering committee" for the Researcher-Facing track, which has served as an example for other tracks to consider as their membership, engagement, and self-imposed responsibilities grow. Furthermore, the track coordinators documented processes for rotating new individuals into their own roles (tested with the Systems-Facing and Data-Facing tracks during the reporting period), recognizing limitations on the ability of volunteers to sustain involvement over long periods, the need for regular infusions of new perspectives and energy, and that the track coordinator role is a professional development opportunity that should be available to more members of the RCD community. Additionally, track coordinators have standardized and documented processes for recording call participants and generating reports for participation analysis (informing statistics, like those further above).

Ecosystem Workshop

The Ecosystem Working Group presented a plenary panel at PEARC19 on defining and ultimately sustaining the ecosystem of research computing and data moderated by Dana Brunson with panelists: Sharon Broude Geva (CASC), Thomas Cheatham (CaRCC), Douglas Jennewein (Campus Champions), and Tobin Magle (RDAP). Subsequently, the working group published a paper at PEARC20, "Fostering Collaboration Among Organizations in the Research Computing and Data Ecosystem" and plans to use the presentation as a call to action to the community to help define and engage in future efforts. This paper will be presented and our call for action will be made at the PEARC20 meeting.

RCD Capabilities Model

The RCD Capabilities Model Working Group built upon the outcomes from an earlier workshop to define the requirements for a maturity model, and developed the 1.0 release of the Capabilities Model and an initial implementation of an associated assessment tool. Implemented as a Google spreadsheet and structured around the five facings, the tool has been downloaded by 81 institutions across 35 states, including a mix of public and private institutions, a range of Carnegie types, and many MSIs. Institutions are being encouraged to complete their assessments and contribute data to a community data set that will be aggregated this fall;

summary reports will be shared publicly and contributing institutions will have access to detailed data for benchmarking. The working group also developed requirements and a development plan for a more robust implementation on a survey platform and richer data exploration tools. The WG published a paper at PEARC20 that summarizes the model, the initial implementation, and a roadmap forward. The WG conducted workshops at PEARC19, EDUCAUSE 2019, and PEARC20 to provide training in the use of the model as part of strategic planning for RCD support; these workshops have also provided valuable feedback that informed refinements included in the 1.0 release version. Several webinars have been presented, including one in collaboration with the EDUCAUSE RCD community group. WG members provide regular office hours to the community, introducing new institutions to the model, and supporting users as they complete their assessments. Additional and deeper engagements have supported the assessment work at a range of institutions including San Diego State University, the University of California system, U. Nevada Reno, the U. Hawaii system, Montana State U., U. of Maine, U. of Alaska, and U of New Mexico. Finally, the WG prepared a grant proposal in collaboration with the RCD Professionalization WG for an NSF CI Center of Excellence Demonstration Pilot, to develop a next version of the assessment tool, to more broadly publicize and support the tool, and to integrate this work with a range of professional development activities into an RCD Resource and Career Center.

RCD Professionalization

Just before the 2019 Annual Report the RCD Professionalization Working Group had just finished the HR Job Family Matrix. This document was socialized with the broader group interested in professionalization that had attended the 2018 CI Professionalization Workshop. We incorporated their feedback and finalized the draft. This final draft is available via a request form on the RCD Professionalization Working Group page https://carcc.org/rcd-professionalization/. To date 50 institutions have downloaded it and 15 are looking to implement this framework with their institutional HR org. Thus far we are aware that Harvard University and Boston University have completed the implementation, and we know that Rutgers and University of Missouri have started working with HR.   The HR Job Family Matrix has been presented at a number conferences or meetings this year including a packed panel at PEARC'19, a Campus Champions call, the CASC Annual Meeting - Spring 2020, and the OU Virtual Residency program. Many people are very interested in this topic at large and are eager for someone to help them with this on their campus. The WG collaborated with the RCD Capabilities Model WG on a grant proposal for for an NSF CI Center of Excellence Demonstration Pilot that would expand upon the current work, develop a Census of RCD professionals, develop a Career Arcs model of paths into and among RCD roles, and develop repeatable models for professional development of staff and students in RCD roles.

Engagement

In support of the People Network, the Facings Tracks, and the other CaRCC Working and Interest Groups, the Engagement Working Group has developed a framework which includes a

list of goals and activities to promote continued growth in inclusive membership and CaRCC activities to advance Research Computing and Data efforts for researchers and research.

Decadal Survey

The Decadal survey effort was organized during the project year, with the start of the new interest group, creation of the draft charter, and the socialization of this idea with the community. The new group was vetted with both members of the CaRCC, as well as at the CASC meeting, XSEDE SPF, and with NSF. Seed funding has been pledged from TACC and XSEDE to expand the effort.

What opportunities for training and professional development has the project provided?

Nearly all of CaRCC activities represent opportunities for professional network and development of leadership and community-building skills, given the roles of working group and interest group chairs, the Logistics Group, and coordinators within the People Network. Furthermore, the People Network's sole purpose is for the professional development of RCD professionals via networking and technology exchange (even for non-technology skills and practices) to support the ongoing improvement of RCD capabilities and research impact, across the country.

How have the results been disseminated to communities of interest?

Communication and Outreach for CaRCC has been performed across a growing number of communication channels and for a wider set of audiences. This included a refresh of the CaRCC website to have a blog on the home page to give updates regularly to the community, new updates to all working and interest group pages, product pages, and about pages to convey the current status of CaRCC and its activities. Communications about People Network track sessions are sent to multiple community groups beyond the people network list including the Campus Champions, the Virtual Residency Program, the EDUCAUSE Research Computing and Data Community Group, the CI Engineers list and the NRP Engagement list. We leverage the PEARC20 conference (and others) to disseminate the many CaRCC work products; this includes several published papers, a town hall discussion, workshops, and birds-of-a-feather sessions.

Prior to SC19 a new CaRCC logo was created and used for laptop sticks handed out at SC19 and following conferences. The logo was also incorporated into the website and presentation slides. In addition to the working group presentations mentioned elsewhere in this report, updates about CaRCC to other groups occur regularly (such as to CASC and Champions at their regular meetings - these have slowed down a bit this summer due to COVID-19 travel restrictions.)

What do you plan to do during the next reporting period to accomplish the goals?

People Network: In the next year, the People Network will continue to add operational improvements and collaboration with related communities toward inclusivity. As mentioned previously, a stakeholder-facing track is in the works and will be launched after inviting other networks of RCD leaders, including the EDUCAUSE Research Computing and Data group. Toward furthering inclusivity, the network will also begin tracking data on participation by individuals from institutions under-represented and/or under-resourced in the CI ecosystem (e.g. EPSCOR, MSIs, CLAC, non-R1) and will increase outreach to these campuses. Engagement plans also include more recruiting of network members to CaRCC working and interest groups. Furthermore, the Data-Facing track is seeding a new steering committee, building upon lessons learned in the Researcher-Facing track.

Ecosystem Interest Group: Following the presentation at PEARC, the working group is transitioning to an Interest Group and intends to gauge interest in defining new objectives for the group and to subsequently act on those objectives (with a new working group charter).

RCD Capabilities Model Working Group: The WG will continue to publicize and support the 1.0 implementation with office hours and periodic presentations, etc. The WG will aggregate data from contributing institutions this Fall and produce reports/analyses on the resulting dataset. If the CI CoE proposal is not funded, the WG will explore other funding opportunities to support that proposed work.

RCD Professionalization Working Group: The WG will continue to publicize and support the HR Job Family Matrix, will explore a census of RCD professionals, and begin work towards a Career Arcs resource. If the CI CoE proposal is not funded, the WG will explore other funding opportunities to support that proposed work.

Engagement Working Group: After preparing a project plan for activities, the working group intends to carry out a number of the framework activities that have been marked high priority, tractable, and realizable in a predetermined time frame. These activities will involve members of the People Network, the various facings tracks, other Working and Interest Groups, and members new to CaRCC to ensure broad participation, inclusivity, and robust outcomes.

Decadal Survey Interest Group: The primary activities over the next year will be to complete a group charter and project plan to advance this interest group to a working group, continue to gather buy-in from the broader community (including ACM SigHPC, the Service Provider Forum, etc.), and to submit requests for funding to launch the broader activity.

Funding and Sponsorship Interest Group: This interest group aims to better map out costs for CaRCC and services and opportunities for private or foundational support.

Products

Website
https://carcc.org/
Charter draft
https://docs.google.com/document/d/1IZMSOEmHzodB1uttKv3-iVNZlZkmLl_qf70XA832l Rg/edit?usp=sharing
CaRCC activities diagram
https://docs.google.com/drawings/d/1sYH-4vincXo7nREgS6quBx-ictI0HyYjzhrBH4uJsRo /edit?usp=sharing
People Network YouTube Videos
The People Network tracks hold (typically) monthly videoconferences, many of which are recorded and placed on the CaRCC YouTube channel - available at:
https://www.youtube.com/channel/UCMU1PEMM7V4X_KtPDcfB6HA

Papers
*1.	Sharon Broude Geva, Dana Brunson, Thomas Cheatham III, James Deaton, James Griffioen, Curtis W. Hillegas, Douglas M. Jennewein, Gail Krovitz, Tobin Magle, Patrick Schmitz, Karen Tomko, and James C. Wilgenbusch. 2020. Fostering Collaboration Among Organizations in the Research Computing and Data Ecosystem. In Practice and Experience in Advanced Research Computing (PEARC '20), July 26–30, 2020, Portland, OR, USA. ACM, New York, NY, USA, 13 pages. https://doi.org/10.1145/3311790.3396645*
*2.	Patrick Schmitz, Claire Mizumoto, John Hicks, Dana Brunson, Gail Krovitz, James R. Bottum, Joel Cutcher-Gershenfeld, Karen Wetzel, and Thomas Cheatham III. 2020. A Research Computing and Data Capabilities Model for Strategic Decision-Making. In Practice and Experience in Advanced Research Computing (PEARC '20), July 26–30, 2020, Portland, OR, USA. ACM, New York, NY, USA, 12 pages. https://doi.org/10.1145/3311790.3396643*

Presentations
- *PEARC19 Ecosystem panel*
  https://pearc19.conference-program.com/presentation/?id=pan112&sess=sess124
- *PEARC19 CI Professionalization panel*
  https://pearc19.conference-program.com/presentation/?id=pan109&sess=sess136
- *PEARC19 CaRCC Town Hall*
  https://pearc19.conference-program.com/presentation/?id=spec107&sess=sess230
- *Capabilities Workshops (PEARC19, EDUCAUSE)*
  https://pearc19.conference-program.com/presentation/?id=work106&sess=sess127
  https://events.educause.edu/annual-conference/2019/agenda/leveraging-a-research-it-m aturity-model-for-strategic-decisionmaking-separate-registration-is-requir

Participants/Organizations

What individuals have worked on the project?

Name / Most Senior Project Role / Nearest Person Month Worked

Dana Brunson / co-PI / 1mo
Contribution: Dana serves on the Leadership team, co-chairs the Logistics Group, the Capabilities Model working group, and the Ecosystem Workshop working group, and serves as co-coordinator of the People Network and track coordinators. Dana also liaises with other community groups.
Funding Support: other Internet2

Lauren Michael / co-PI / 3mo
Contribution: Lauren serves on the Leadership team, co-chairs the Logistics Group and the People Network committee, serves on the Charter committee, and serves as co-coordinator of the People Network and track coordinators.
Funding Support: other UW-Madison funding

Thomas Cheatham / Other Professional / 1mo
Contribution: Tom serves as the CaRCC Council Chair, serves on the Leadership team, chairs the Charter committee, manages the CaRCC website, participates across working groups to ensure alignment within CaRCC activities, and liaises with other communities in the ecosystem (Champions Leadership Team, CASC).

Gail Krovitz / Other Professional / 1mo
Contribution: Gail served on the Leadership team and co-chaired the Logistics Group and Ecosystem Workshop Working Group.
Other Funding Support: Internet2

Patrick Schmitz / Other Professional / 2mo
Contribution: Patrick serves on the Leadership team and Logistics Group, co-chairs the Capabilities Model Working Group and the RCD Professionalization Working Group, and serves on the Charter committee.
Other Funding Support: Semper Cogito Consulting, LLC

What other organizations have been involved as partners?

Association of Research Libraries, https://www.arl.org/
Big Data Innovation Hubs, https://www.bigdatahubs.io/

Campus Champions, https://www.xsede.org/community-engagement/campus-champions
The Carpentries, https://carpentries.org/
Coalition for Academic Scientific Computation (CASC), https://casc.org/
Coalition for Networked Information (CNI), https://www.cni.org/
EDUCAUSE, https://www.educause.edu/
Engagement Performance Operations Center (EPOC), https://epoc.global/
Energy Sciences Network (ESnet), http://es.net/
Global Environment for Network Innovations (GENI), https://www.geni.net/
Great Plains Network (GPN), https://www.greatplains.net/
HPC Systems Professionals (HPC Sys Pros), https://sighpc-syspros.org/
HPC University, http://hpcuniversity.org/
Internet2, https://www.internet2.edu/
Midscale Experimental Research Infrastructure Forum (MERIF),
https://www.us-ignite.org/news/upcoming-midscale-experimental-research-infrastructure-forum-merif-education-workshop/
Minority-Serving Institutions (MSI),
https://www.doi.gov/pmb/eeo/doi-minority-serving-institutions-program
Open Science Grid (OSG), https://opensciencegrid.org/
Research Data Access & Preservation Association (RDAP), https://rdapassociation.org/
SIGHPC Education (of ACM), https://sighpceducation.acm.org/
Women in HPC (WHPC), https://womeninhpc.org/
XSEDE, https://www.xsede.org/

What other collaborators or contacts have been involved?

Other Leadership Team members (working group and interest group co-chairs):
Gwen Jacobs, University of Hawaii
Jackie Milhans, Northwestern University
Andy Sherman, Yale University
Barr von Oehsen, Rutgers University
Jim Wilgenbusch, University of Minnesota
Scott Yockel, Harvard University
Dhruva Chakravorty, Texas A&M University
Ruth Marinshaw, Stanford University
Dan Stanzione, University of Texas at Austin (TACC)
John Towns, NCSA, University of Illinois at Urbana-Champaign
Bob Freeman, Harvard University
Claire Mizumoto, University of California San Diego

People Network Track Coordinators:
Bob Freeman, Harvard University
Brian Haymore, University of Utah

Christina Maimone, Northwestern University
Claire Mizumoto, University of California San Diego
Matthew Rich, Northwestern University
Alan Silver, UW-Madison
Galen Collier, Rutgers
Deb McCaffrey, University of Michigan
Rich Knepper, Cornell
Jane Combs, University of Cincinnati

Impacts

What is the impact on the development of the principal discipline(s) of the project?

CI professionals play a very important, albeit sometimes under-appreciated or acknowledged, role in supporting researchers and research in their use of advanced cyberinfrastructure, or research computing and data, broadly defined, in a time of increasing diversity and complexity of services. During the recent time when all research became remote, CI professionals found themselves in a place of high demand as supporting remote research is the norm. CI has evolved beyond traditional HPC into a vast array of services and needs, with an ever expanding number of researchers and disciplines requiring help and support. Many of the CI professionals are being called on to help create remote capabilities for academic courses, especially those that use data science or quantitative approaches. CI professionals need to define the profession and CaRCC is helping to do this while also trying to bring together the broader community that has already emerged to support research and researchers with their CI needs.

What is the impact on other disciplines?

By improving support to research CI professionals, both within institutions and cross-institutionally, CaRCC aspires to improve research outcomes across disciplines achieved via the use of CI. Therefore, impact on other disciplines is a critical indirect outcome of all CaRCC activities and impacts.

What is the impact on the development of human resources?

People across a range of roles support research computing and data (RCD) services; the community of people in these roles is evolving into a distinct profession, and is widely understood to be an integral part of scholarly research. CaRCC is supporting this evolution of thought through a series of targeted initiatives. Our vision is to develop and disseminate frameworks, models, and approaches that can be used by institutional leaders in Human Resources, Information Technology, Research, and Teaching & Learning, as well as by practitioners, to support and elevate RCD roles as distinct and highly-valued career paths. See also "*What opportunities for training and professional development has the project provided?*".

What is the impact on physical resources that form infrastructure?

NTR

What is the impact on institutional resources that form infrastructure?

See *"What is the impact on other disciplines"* and *"What is the impact on the development of human resources?"*.

What is the impact on information resources that form infrastructure? (was missing)

What is the impact on technology transfer?

See "*Major Activities*" and *"How have the results been disseminated to communities of interest?"*.
See "Major Activities" and "How have the results been disseminated to communities of interest?".

What is the impact on society beyond science and technology?

The long term impact of CaRCC is to enable science and engineering education and discovery. While impossible to quantify for the long term, these impacts will be felt at many levels of society from the enabling of leaders with analytics skills to workforce development to new products and services that benefit humankind.

Changes/Problems

Changes in approach and reason for change

N/A

Actual or Anticipated problems or delays and actions or plans to resolve them

N/A

Changes that have a significant impact on expenditures

N/A

Significant changes in use or care of human subjects

N/A

Significant changes in use or care of vertebrate animals

N/A

Significant changes in use or care of biohazards

N/A

Special Requirements

Responses to any special reporting requirements specified in the aware terms and conditions, as well as any award specific reporting requirements.

N/A