

Towards a National Best Practices Resource for Research Computing and Data Strategic Planning

Technical Report
RCDNexus-TR-2022.1

Patrick Schmitz
Semper Cogito Consulting
Berkeley, CA USA
patrick@sempercogito.com

Dana Brunson
Internet2
Stillwater, OK USA
dbrunson@internet2.edu

Claire Mizumoto
University of California
San Diego, CA USA
claire@ucsd.edu

Douglas Jennewein
Arizona State University
Tempe, AZ, USA
douglas.jennewein@asu.edu

Scotty Strachan
University of Nevada
Reno, NV, USA
strachan@unr.edu

Executive Summary

A PEARC21 workshop gathered Research Computing and Data (RCD) professionals to discuss leading practices for developing effective strategic plans for their Research Computing and Data programs. Workshop participants were familiar with issues around supporting Research Computing and Data, had experience contributing to strategic planning, and had some exposure to the RCD Capabilities Model. Workshop participants learned about common practices for strategic planning, heard from a panel of three RCD program leaders who described their campus culture/climate around strategic planning and support for RCD, their group's approach to RCD planning, and the role of the RCD Capabilities Model in this context; and engaged in a discussion with the panelists on these topics. Workshop participants then broke into groups to explore and compare current strategic planning practices at their respective institutions, and additionally to identify requirements for a community resource to support strategic planning.

This report documents the workshop activity and findings, including shared observations as well as recommendations. In particular, we detail four themes that emerged as "Desired elements of a strategic planning resource":

- A repository of templates, examples, and models of strategic planning
- A collection of narratives and use-cases that describe successful programs
- Examples and practices for communication strategies related to strategic planning
- A program of mentoring and identifying expertise related to strategic planning

We describe possible approaches to assembling these resource elements as part of the RCD Nexus Resource and Career Center, noting that while there is a close alignment between the goals of a strategic planning resource as envisioned by the workshop participants and the goals for the RCD Nexus program and associated CaRCC working groups, the resources available during the Demo Pilot phase of the NSF supported RCD Nexus CoE program are limited, and some of the recommendations may need to be incorporated into NSF proposals for a full CoE program. Finally, we note some related efforts that are exploring similar issues.

Contents:

1. Introduction	2
2. Workshop structure and presentations	4
3. Common themes: challenges and experiences	6
4. Desired elements of a strategic planning resource	9
5. Approaches to developing strategic planning resources	12
6. Related efforts, potential synergies	14
7. Acknowledgements	16
8. References	16

1. Introduction

Research is increasingly dependent upon end-to-end Cyberinfrastructure (CI), from instruments and sensors to Research Computing and Data¹ (RCD) infrastructure and services. The rapid evolution and diversification of RCD in response to more complex research workflows poses significant challenges to academic institutions as they try to effectively assess and plan for the necessary resources required to keep pace with the growing needs of researchers. The lack of a shared vocabulary to describe the various aspects of RCD support has traditionally hindered efforts to discuss and plan coordinated efforts to advance support of, and for, researchers. These challenges are especially acute for smaller and emerging RCD support organizations, which often lack experience supporting RCD and have limited resources to develop an analysis framework for strategic planning.

To address these gaps, a collaborative team within the RCD ecosystem developed a Research Computing and Data Capabilities Model² (RCD CM) [15],[10] that allows organizations to self-evaluate across a range of RCD services and capabilities for supporting research, leveraging a shared vocabulary to describe RCD support. The Model supports a range of stakeholders and provides structured input to guide strategic planning and enable benchmarking relative to peer institutions and/or to various segments of the community.

Previous workshops at PEARC19 [14] and EDUCAUSE 2019 [9] introduced the model and its use. In the course of community discussions including regular “office hours” held by the CaRCC RCD CM working group, community members regularly asked about how different institutions were using the model as part of the strategic planning processes. More generally, people were interested in good practices for developing strategic plans for their RCD programs.

In response, the working group organized a workshop at PEARC21³ that brought together Research Computing and Data professionals to learn leading practices for developing effective strategic plans for their Research Computing and Data programs, and to explore how to share good practices more broadly [8]. This workshop built upon the earlier workshops and is part of a related, ongoing workstream within the RCD Nexus, an NSF-funded Cyberinfrastructure Centers of Excellence (CI CoE) pilot to develop a Research Computing and Data Resource and Career Center [7].

We declared these three goals for workshop participants and for the workshop as an activity:

1. **Share the experiences of universities** who are currently using the RCD Capabilities Model as part of their RCD strategic planning work, including lessons learned.
2. **Discuss the range of RCD strategic planning models** across the community, and *identify approaches to building a strong strategic planning practice.*

¹ “Research Computing and Data” (abbreviated as RCD) includes technology, services, and people supporting the needs of researchers and research, and is intended as a broad, inclusive term covering computing, data, networking, and software. The National Science Foundation uses the term “cyberinfrastructure,” and others use “Research IT.”

² Now maintained and supported by the CaRCC RCD Capabilities Model Working Group. <https://carcc.org/rcdcm/>

³ Practice and Experience in Advanced Research Computing <https://pearc.acm.org/pearc21/>

3. **Work towards the development of a shared community resource⁴ to support strategic planning for RCD, *identify potential elements of such a resource and a near-term roadmap for development.***

1.1. Background and usage of the RCD Capabilities Model

The initial version of the RCD CM was developed as a collaboration among the Campus Research Computing Consortium (CaRCC)⁵, Internet2⁶, and EDUCAUSE⁷, with support from the National Science Foundation (NSF OAC-1620695) and from many volunteers who provided input and review from a diverse set of universities (large and small, public and private) and related organizations.

A few data points about current interest and usage of the first version of the model, which became publically available in January 2020:

- 157 institutions have requested a copy of the RCD CM Assessment tool, including 86 R1s (over half of all R1s in the U.S.) as well as 26 R2s, and various other institutions.
- **88% of these institutions indicated “Strategic Planning”** as an intended use of the tool.
- Institutions using the RCD CM represent 47 U.S. states and 4 Canadian Provinces, with a mix of public and private, R1, R2, and other Carnegie Classifications, and many EPSCoR-eligible⁸ and minority-serving institutions.
- The 2020 Community Dataset⁹ includes assessment data from 41 institutions and provides important insights into the state of support for RCD, at both a summary and more granular level.

The Assessment Tool also allows institutions to mark specific capabilities as *priorities*, usually as input into their strategic planning work. The aggregated priorities data in the Community Dataset provide insight into the areas in which institutions plan to place emphasis, devote resources, etc. Among the roughly 150 areas of capability in the RCD CM, institutions indicated these two among their top priorities (i.e., as areas for particular attention; the overall rank is in parentheses):

- **Does your Research Computing and Data (RCD) team/group have a strategic plan? (#5)**
- **Are Research Computing and Data services funded in a sustainable manner? (#2)**

In the report, EPSCoR-state institutions listed these as their *top two* priorities, and the third highest was:

- **To what extent is there a clear vision, effective guidance, and strategy for the allocation and prioritization of support resources/personnel?**

Clearly, there is a strong interest in, and need for, strategic planning support, especially among institutions with less research funding and/or with emerging RCD programs. The PEARC21 workshop was designed to help institutions understand how to work from a self assessment (using the RCD CM) to develop a strategic plan for research computing and data.

1.2. Institutional demographics of workshop participants

Participants at the workshop were primarily from R1 and R2 universities (see Fig 1), and mirrors the mix of attendees at PEARC conferences generally. Although R3, M1, M2 and Baccalaureate institutions represent a larger proportion of those who have downloaded a copy of the RCD Capabilities Model, these smaller institutions may not have had resources to attend PEARC.

⁴ This resource is planned to be part of the RCD Nexus resources available at: <https://carcc.org/rcd-nexus/>

⁵ <https://carcc.org/>

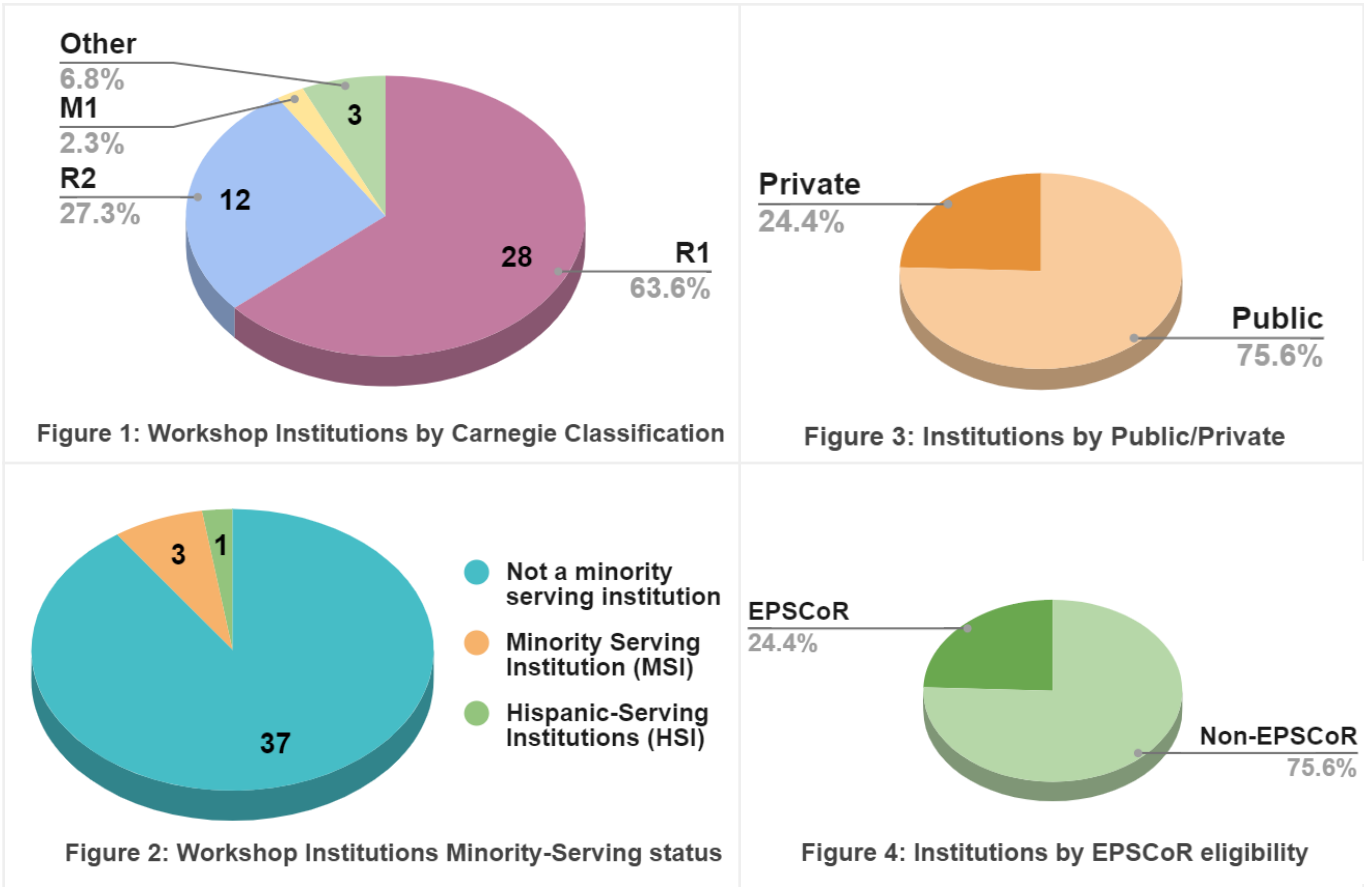
⁶ <https://www.internet2.edu/>

⁷ <https://www.educause.edu/>

⁸ An EPSCoR-eligible jurisdiction is defined as a state, U.S. territory or U.S. commonwealth that receives less than or equal to 0.75 percent of NSF research funding. The program mission states: “EPSCoR enhances research competitiveness of targeted jurisdictions...by strengthening STEM capacity and capability.” See, e.g., <https://www.nsf.gov/od/oia/programs/epscor/>

⁹ Patrick Schmitz. 2020. *2020 RCD CM Community Data report*. <http://doi.org/10.5281/zenodo.4344057>

The mix of public and private institutions (Figure 3) is fairly representative of the overall mix of public and private research universities in the U.S. as is the mix of institutions from EPSCoR eligible states vs. those in non-EPSCoR states (Figure 4). These proportions also mirror those that have downloaded the RCD Capabilities Model, and so are representative of that community generally. Minority serving institutions were somewhat under-represented among the workshop participants, as indicated in Figure 2.



2. Workshop structure and presentations

The workshop began with brief introductions, a description of the agenda, and the goals for the workshop (as noted in Section 1). A short presentation provided an introduction to the practice of strategic planning¹⁰, describing:

1. **Prerequisites and Principles**, including the need for assessment of the existing support, ensuring that the resulting RCD strategic plan is aligned to, and clearly supports the campus-level research and IT goals.
2. The need to clarify the group’s **motivations and the institutional context**, noting the key stakeholders, their pain points or driving concerns, and the main challenges facing the group. In addition, participants were encouraged to think about **who they needed to influence** or convince in order to be successful in implementing a strategic plan, and the importance of goals that are ambitious without being completely unrealistic.

¹⁰ Presentation slides are available here: drive.google.com/file/d/1ttOgKrzOQS2V08URz1OLio-X4Flgb78t/view, and the presentation recording is available as part of the CaRCC Youtube channel: youtube.com/watch?v=tyh1t451MjA&list=PLV-SC0CHLTwes3g_v94n84dNHx3i5Klg9&index=2. The discussions were not recorded, so that participants could be candid in their comments.

- The widely used **OGST planning framework**, with a discussion and examples of each level: Objectives, Goals, Strategies, and Tactics (illustrated in Figure 5). Additional tools/exercises were mentioned including SWOT (Strengths, Weaknesses, Opportunities, Threats), Start/Stop/Continue, and the use of a Skills Matrix for RCD organizations.



Figure 5: An illustration of the OGST framework

Following the introduction, participants heard from a panel that included Gwen Jacobs of the University of Hawai'i, Scotty Strachan of the University of Nevada, Reno, and Doug Jennewein of Arizona State University. The panelists were prompted to describe their campus culture/climate around strategic planning and support for RCD, and then to describe their group's approach to RCD planning, and the role of the RCD Capabilities Model in this context. A question and answer segment allowed the workshop participants to follow up and clarify points from the panelists' talks.

After the panel discussion, workshop participants were split into 6 groups of about 8 or 9 individuals each for breakout discussions. After the breakout sessions, each group reported back and the common themes were discussed by all participants together. Breakout groups were encouraged to keep notes of their key discussion points.

In the first breakout session, groups were asked to **explore and compare current strategic planning practices** at their respective institutions, with these specific prompts:

- Who is driving your priorities, and what are their main concerns/pain points?
- Who has decision-making authority (or can otherwise make or break your goals), who has influence over them? How have you tried to (or how could you) get them to be an advocate for your program?
- Have you tried something like the OGST model? What has worked, and what hasn't? What seems promising to you?

In the the second breakout session, breakout groups focused on requirements for a **community resource to support strategic planning**, with these specific prompts:

- What elements of a shared resource would be most useful?
- How do we support planning for both smaller and emerging centers, as well as for larger and more experienced centers?
- What is the low-hanging-fruit, and what needs more work, and/or community input and support?

3. Common themes: challenges and experiences

When asked about **challenges and pain points** for their programs and the researchers they support, a number of themes emerged:

- **Funding and sustainability of RCD services and programs** was an overarching theme, and an exacerbating factor for many other challenges. A related theme was the need to document return on investment and similar business modeling for investments in RCD programs. Several institutions described challenges of providing training with limited resources, especially for programs based upon a basic recharge model (in which there is no support beyond the core service). More established programs said it had to be built into the cost model, but this was daunting for less well-established programs.
- Many noted the **constant change and evolution of computing models, hardware**, etc. and the need to **evolve services and add new services in response**. This ranges from the growing demand for GPUs and other new compute hardware in campus clusters, to support for researchers using cloud computing. A related challenge was the increasing breadth and diversity of domains that are using RCD, which in turn requires a more diverse set of support resources (with experience in the respective disciplines), expertise with the tools and techniques, and associated training demands.
- A range of challenges were noted around **storage and related services, especially for sensitive and/or controlled data**. As one participant noted: “When we expanded beyond compute to storage, our customer numbers for storage quickly surpassed our total prior compute customer count. There were more untapped storage users out there than all compute combined.” Another participant chimed in: “We noticed this as well. Many people need advanced computing, but *everyone* needs storage.” Participants described compliance challenges associated with sensitive and/or controlled data, and challenges in educating users about how they must use resources to conform to compliance requirements.
- **There is pervasive difficulty finding, hiring, and retaining staff, especially for certain areas of expertise**, and many noted difficulties “justifying to campus leadership” the funds needed to support the staff who underpin the RCD technology and services. In addition to the need for expertise needed to address the pain points above, staffing for training and pre-award support were called out as gaps in current programs.

These points are generally consistent with the findings in previous related workshops (e.g., [1], [2], [3]), and provide the context in which strategic planning must be done.

3.1. Program drivers

There was broad agreement that researchers and their needs were the primary drivers of planning for RCD programs. Participants described a range of approaches to gathering input:

- **Steering Committees** and/or **Faculty Advisory Committees** (including both faculty and administrative representation)

- **Focus Groups/Retreats**
- **Needs assessments/surveys**
- **Pre-proposal questions** (in coordination with Office of Sponsored Projects)
- Feedback on trainings

Underscoring the importance of researcher input to drive planning, one breakout group discussed “the need to build trust with users, and to convince them their input is being heard.” One group observed: “institutions with large RCD teams and steady-state operations are really letting faculty drive the priorities, since they are closest to the action.” However, participants also noted challenges in gathering and managing input from researchers, including:

- Faculty priorities that are associated with grants may not be communicated to the team doing strategic planning.
- Several participants noted that “Some high profile faculty have disproportionate influence,” and may not represent the broader needs of campus researchers.
- New investigators can drive the conversation (for better or for worse), especially if they have come from institutions with more resources.
- Different disciplines have different priorities, which can pose conflicts that are hard to resolve, especially without an effective strategic plan.

In addition to researchers, a range of additional drivers were described, and these were sometimes in tension with the needs of researchers:

- **Senior leadership sets top-down goals, researchers set bottom-up goals.** Without good planning these may or may not meet in the middle. Several groups noted that “research leadership priorities and faculty expressed needs are often not aligned.”
- Authority (i.e., the final say in strategic decision-making) often comes from whoever has budget, and/or has power to kill projects/processes. “Budget and priorities [e.g., from a steering committee] are interchangeable as drivers.”
- One group mentioned outside (the university) entities such as state politics (including state trustees/regents) and federal mandates as drivers.

3.2. Participants’ experience with strategic planning frameworks and practices

Participants described a broad range of experience with strategic planning for their RCD programs, ranging from no strategic plan at all, to formal processes and the use of frameworks like OGST. This made for a lively discussion of good practices as well as challenges to good strategic planning efforts. Some of the observations shared with the group discussion include:

- **Many lack strategic plans** - “just do what it takes to get to R1”
 - There is no roadmap, just a high-level goal.
- There is often **a network of service providers that must coordinate to support researchers**, and yet **service providers or related groups are often siloed**, posing challenges for effective planning and coordination across the organization. Some practices to address this included:
 - Work was often required to show Central IT the connections between IT Strategic Plans and Research Strategic Plans.
 - Partner with other service providers (e.g., HPC, Library) to build critical mass of support.

- Accept that the perceived center or hub of coordination may not be the HPC center.
- **Emerging programs in particular described challenges dealing with independent RCD projects** (not coordinated with a campus RCD program, e.g., departmental and project-based clusters).

Some institutions have used an OGST framework (or some variant). However, even with a good process and practice for strategic planning, they described a number of challenges to effective planning and to executing plans:

- **A common challenge was “getting agreement on goals”** (across the different stakeholders).
- **Objectives may come from outside the reporting line** (e.g., from the Provost or VPR, where the RCD program reports up to the CIO). Similarly, the library is usually an independent reporting line, adding to coordination challenges.
- One group observed: **“Very few people understand strategy vs. tactics** (or objectives vs. tactics)” and when these lines blur, it becomes **difficult to get effective feedback** on plans. Another participant commented: “Institutions have objectives and goals, but strategies and tactics often need further development.”
- Several groups described challenges in balancing the needs of a few well-funded researchers against the common good.
- Several participants described how a program’s funding model (e.g., subsidized vs. cost-recovery) can impact a group’s ability to do long-term planning and evolution (e.g., new service development), observing that it is “hard to respond to faculty priorities in a recharge-based environment.”

There was **much related discussion of the challenges in maintaining a plan over time** (as needs evolved), and in shifting priorities. Many noted the challenge of balancing broad (and usually longer term) strategic planning against more agile/nimble planning in response to emergent needs (e.g., a big new grant): “Plans can become outdated.” Events may require a reset of a strategic plan, groups should have a process (and the expectation) that this may happen: One group had examples in which structured planning was seen to work:

- “The RCD plan responds to changes in institutional planning”
- “Working-group contributions to high-level objectives that translate to tactical AGILE approach”
- “Too much structure might drag out the process.”

There was a **spirited discussion of how best to make the case for new priorities and initiatives**. This included the need for clear, compelling proposals (“VP/VC Research makes decisions, but wants fully baked ideas, clear needs with peer comparison and clear ask.”), as well as strategies for building influence, including:

- **Partnering with faculty and other service providers** (e.g., HPC, Library) to build critical mass of support and advocacy (influence): “Find the faculty who are not afraid to directly call the Provost or CIO to make waves or get something done.”
- **Identifying advocates to move smaller projects forward**, recognizing that larger ones require more governance/red tape. This entails distinguishing what needs to go into an Strategic Plan that is seen up and out, from what is internal planning (i.e., distinguishing *strategy* from *tactics*).

Participants with successful processes noted that **“extensive networking with leadership and researchers is needed** to get the right balance,” and also cautioned that a **change in leadership at the CIO or VPR level can change the focus on funding RCD**.

In a discussion of aligning the RCD strategic plans to the campus context, one participant observed: “It almost seems like you need several layers of OGST. The ... Office of Research uses OGST for their strategy, but their ‘T’ [tactics] almost seems like it needs to be the ‘O’ [objectives] for the Research IT department’s strategy. OGSTs all the way down...”

4. Desired elements of a strategic planning resource

There was a rich set of suggested resources that would help institutions with strategic planning, with some that were seen as particularly useful to emerging RCD programs. The main themes among these suggestions were for:

1. **A repository of templates, examples, and models of strategic planning**
2. **A collection of narratives and use-cases that describe successful programs**
3. **Examples and practices for communication strategies related to strategic planning**
4. **A program of mentoring and identifying expertise related to strategic planning**

4.1. Suggestions for Templates, Examples, and Models

The most common request was for **templates for a strategic plan** and a **repository of example plans**. More specifically, participants requested:

- Common Strategies, goals and objectives that could be reused/used as inspiration
- Include strategic plans as well as NSF CI plans. [N.B.: As a point of comparison, consider the many sources of advice and examples for Data Management Plans, e.g., the NCSU Libraries “Elements of a Data Management Plan” website¹¹].
- Strategic plan templates that scale as the RCD program grows and expands, similar to job families and career paths

One group requested “Recipe books for services” to understand how a successful service was implemented at other institutions, however there is (already) much discussion of this topic in various RCD communities of practice. In addition, capturing detailed plans may prove challenging for some services that are closely tied to campus policy, such as services in support of sensitive and/or controlled data where the office of the CISO must assess the service providers’ approach to addressing requirements of data use agreements (DUAs).

Many participants requested help related to **needs assessment and gathering input from Researchers**. It was noted that “Survey creation is really challenging [and] labor intensive.” Requested resources included:

- Examples of **Pre-proposal questions (in coordination with Office of Sponsored Projects)**
- Models and templates for doing needs and related assessment (in addition to the RCD Capabilities Model. In particular, participants were interested in examples/templates for faculty surveys:
 - “Want to feed faculty needs into Strategic Planning process”
 - “Need to assess satisfaction with services (important to building support/advocacy)”
 - “Annual survey for researchers to capture their needs”
- Models for gathering data that feed into Impact reports (e.g., “How to get information like publications from faculty who are using your resources”).
 - Some institutions collaborate with their research administration groups for this
 - This is sometimes combined with the faculty surveys described above.

In addition to the reports provided to contributors to the RCD Capabilities Model Community Dataset [13], participants expressed interest in **models and frameworks for peer benchmarking**, including e.g. work done by NYU and UC Berkeley on a service benchmarking framework [11], [12].

In some cases, there were requests for tools and references that already exist, highlighting the need for more (and possibly new approaches to) work to raise awareness of these resources. One example was a request for a tool “to work with individual faculty on their DMP for their proposal” - for which the widely used DMPTool (<https://dmptool.org/>) would seem to fit the need. While a shared resource can include pointers to existing

¹¹ <https://www.lib.ncsu.edu/do/data-management/elements-of-a-dmp>

resources, we should consider outreach and other approaches to making people aware of what is available (and what they could contribute!).

Variations on the RCD CM and/or suggestions to extend it

A common request was for more information about the size of RCD teams at other institutions and their program budget when comparing Capabilities Model results. Similar requests have been made in other outreach activities for the Capabilities Model working group. Ideally, people would like to see a standard RCD data model or statistics that could be exchanged among peers, including things like the number of staff (in different roles), the funding mix (recurring “hard” funding as well as periodic “soft” or one-time funding), and the total budget for a given program.

Working group members were uncertain whether many institutions would be willing to share this sort of information, but we can try asking this (allowing them to decline to answer), and see what happens. This could either be part of the meta-data gathered at some point in the Capabilities Model workflow (e.g., when they submit a completed assessment), or it might be a separate effort.

Some of this data was gathered as part of a survey recently completed by the RCD Professionalization Working Group¹² to better understand the state of RCD staffing across the United States. This would only be available in aggregate, however that survey leveraged an institutional metadata model similar to the RCD Capabilities Model, which should facilitate some correlation between the two datasets (the results of the RCD Professionalization Working Group survey are set to be released in 2022).

4.2. Collections of narratives/case-studies

In particular for emerging RCD programs, there was strong interest in reading about how more established centers conducted strategic planning, and executed those plans to get where they are. Examples and aspects that would help include:

- “This is how our strategic plan evolved before, during, and after completing the [RCD Capabilities Model] assessment.”
- How to make decisions among disparate needs (e.g., across different disciplines)?
- What worked and did not?
- Identify cases in which they evolved from siloed/federated/disaggregated support to centralized/shared.
- Note institutional requirements that influenced the Strategic Planning process and form.
- What are the key elements needed to bootstrap a Strategic Plan, and an RCD program?
- Experience narratives with operational models to identify leading practices.

A possible challenge in providing useful narratives will be to motivate groups to develop tools and processes that are generalizable for broader use in the community. In addition, we must balance privacy for those who wish it (e.g., with anonymized narratives), against the value of being able to contact someone based upon their narrative (which relates to the theme of mentoring, below).

Related to these collections are a number of activities that would support the use of the collections, including support for targeted discussions and cohorts based upon shared characteristics. This led to a discussion of audiences that will use resources provided by the RCD Nexus portal, and the need to ensure materials on the portal are clearly labeled for the intended/appropriate audience(s) (e.g., emerging vs. well-established). One participant commented: “Bear in mind that smaller centers may be more interested in learning more/all of the RCD landscape while larger centers may be more interested in inspirational state compared to peers.” Another breakout

¹² <https://carcc.org/rcd-professionalization/rcdprof-census/>

group noted that “[It is] hard to know where to start if you are new to the community - CARCC, vs Campus Champions vs CASC.” Additional observations and suggestions made in this discussion included:

- Audiences may differ across smaller and larger centers: e.g. faculty users vs. executive leadership
- CASC is known as a good resource for peer advice and community, but has not traditionally been seen as inclusive of small institutions and individuals/groups who do not have a central campus organization to join.
 - It was noted that CASC, CaRCC, and Educause are working on a Strategy and Policy facing community group, and CaRCC has an Emerging Centers track in the People Network.
- One group suggested **starting with a narrower focus than all of RCD/CI** (e.g., RDM, Data Sci) rather than boiling the ocean of campus-wide RCD needs in the first step.

Finally, there was some desire expressed for a collection of **models for organizational structure** that might be shared or at least referenced by RCD management. It was suggested that such models should describe “Who is responsible for what ‘facing’ and where do they report up?” and would (presumably) include some annotations or commentary from those who have leveraged each model on the implications (positive and negative) of the model in practice, and in different organizational contexts. This may best fit into the use-case study/narrative model, and be another topic for the collection of such resources described above.

4.3. Example communications strategies

Many participants described struggles to effectively communicate their needs, their strategic priorities, their goals, and the value they are providing to the campus, and in particular to senior leadership. Some of the areas that institutions are seeking help with (including examples and approaches) include:

- **Examples of communications strategies, plans**
 - Strategies for outreach
 - How to get researchers to engage and participate (e.g., in needs/satisfaction surveys)?
 - Approaches to getting information to faculty
- Examples or practices of how institutions used the RCD CM Benchmarking and related **reports to make their case to executive leadership**.
 - **How to make the case for staff as well as infrastructure?**
 - Templates for use with presenting plans
- **Need to manage up in response to top-down priorities, as well as managing out to researchers** (and their needs). Several common challenges were noted:
 - Academic leadership often sets the research goals (e.g., growing the research program to achieve R1 status) but the RCD organization often reports up through CIO, presenting a gap in matching investment (budget) to the research goals.
 - Advocating for sustaining funding. It is often easier to secure one-time funds for a cluster or other improvement, than to get recurring funds to operate and fully support the resources.
 - Making the case for return/value on investment (to campus leadership).
 - Related to this was a discussion of how to develop useful metrics and gather associated data.
 - A requested resource was example metrics for services, beyond the general “access to” criteria in the RCD Capabilities Model.
 - Other offices and roles may have veto authority (usually because of how the budget process works), and groups need to manage them as well.
 - Models for mapping networks of influence on campus may be useful for this.

- How to communicate and establish **the difference between research and enterprise services**
- How to “sell” a proposal: **provide a repository of pitches, successful and unsuccessful**

Related to these communications resources was a request to the working group (and/or to the RCD Nexus program) to foster continued communications and exchange about the topic of strategic planning for RCD programs. Some specific examples were:

- More frequent workshops like this
- Mock strategic planning sessions

4.4. Support for mentoring programs

Workshop participants expressed considerable interest in support for mentoring, echoing comments we have heard in various related discussions (e.g., in office hours and other open community discussions). Some of the specific suggestions included:

- Provide pointers to existing programs (where these fit needs). N.B.: the point was made that there are some existing mentoring programs, such as that facilitated by the Women In HPC organization¹³.
- Participants were not aware of a mentoring program that is targeted at RCD professionals and that supports or facilitates peer mentoring for RCD Strategy and Policy facing roles (e.g., focused on leadership challenges and practices).
- One group proposed some sort of *Contact list* or “Book of Experts” who could help inform decision points, and would be available to provide advice, e.g., to avoid reinventing wheels and/or making poor decisions. Workshop organizers note that the Campus Champions list provides this for the broad range of RCD Professionals, and that lists such as the EDUCAUSE CIO Community Group list provides this for Administrative IT leadership.

Related to mentoring, one group suggested the idea of a graduate student fellowship or equivalent for “a Business School type” to assist with local business model / plan development.

5. Approaches to developing strategic planning resources

The RCD Nexus Demo Pilot will develop an initial portal infrastructure to act as an RCD Resource and Career Center (RCC). This will provide a framework within which we can build out some of the resources that have been recommended by the workshop participants. While there is strong interest and alignment to the long-term goals of the RCD Nexus program, the resources available during the Demo Pilot phase are limited and largely allocated to more urgent near-term projects. We may be able to make some progress in certain areas, but in others we may leverage the recommendations in the planning process for a full CoE proposal. The following are potential approaches to the main recommendations, and **are by no means hard commitments for specific deliverables**.

Note that for all the resources described/proposed, there is both an initial effort or activity to bootstrap the resource and to gather, edit, and publish some initial content, as well as an ongoing activity to solicit and incorporate additional content from the community (again including editorial and publishing work). The ongoing activity is clearly outside the scope of the RCD Nexus Demo Pilot program, and should be considered as part of the work proposed in a full CoE proposal.

¹³ See: <https://womeninhpc.org/community/mentoring>

Theme 1: A repository of templates, examples, and models of strategic planning

Potential approaches:

- We can begin to sketch the information architecture for organization such a set of resources, and time permitting, include this area among the considerations that a user-centered design process explores for the RCC.
- We can also open a solicitation to the community for content in this area. We would need to recognize that Initial contributions may be rough or in the form of notes, rather than polished repeatable templates ready for sharing, however these contributions would still inform the needs for editorial support as part of a later proposal.

Theme 2: A collection of narratives and use-cases that describe successful programs

Potential approaches:

- As above, we can explore the information architecture and metadata requirements around such a collection, and how the community would want to explore such a collection.
- We would probably want to have some standard structure to these narratives, at least at a very high level, so that readers can consistently get key questions answered about the described programs.
 - One approach to defining this structure would be to solicit interest in a working group that facilitates discussion of the desired elements in a prototypical use-case narrative, with the goal of defining a high-level structure, or set of questions, that contributions should follow.
 - Some editorial support will be important so that contributors can focus on content and not worry too much about wordsmithing or presentation.
- One approach to gathering these narratives would be to interview community members and then write up the narratives. This relies much less on the initiative of the community contributors, and may help to ensure a consistent structure and model for the contributions
 - We might sponsor/hire an intern or fellow to conduct these interviews. Students who are doing a double major combining journalism and some science are good candidates for such a position. We might approach students who are pursuing science journalism¹⁴.
 - The intern approach will still require editorial support, as well as some supervisory overhead.

Theme 3: Examples and practices for communication strategies related to strategic planning

Potential approaches:

- We would probably take a similar approach to this as to Theme 2, inasmuch as both are collections of narratives about successful programs, albeit with a different focus.
- These narratives are likely to be more like discussions between or among subject matter experts, such as RCD Professionals in Strategy and Policy facing roles.
 - This may suggest a model for gathering these: invited panel discussions or roundtables that address the specific questions and areas identified in section 4.3 (above).
 - In any case, editorial support will be needed, as well as resources to organize and facilitate the discussions.

¹⁴ Models exist for such internships, such as <https://www.aaas.org/careers/science-news-writing-internship> and <https://serc.si.edu/media/science-writing-and-communications-internship>. An excellent resource for both program organizers as well as potential interns is available here: <https://www.theopennotebook.com/2017/05/23/finding-and-landing-the-right-internship-in-science-writing/>

Theme 4: A program of mentoring and identifying expertise related to strategic planning

Potential approaches:

- As was noted in section 4.4, there are some existing programs for mentoring; while these may not meet all the needs identified by workshop participants, we want to leverage and support these existing programs where it makes sense.
 - One activity is therefore to identify existing mentoring opportunities, and provide pointers to these. This is a relatively straightforward task (at least initially), and could be integrated into an early version of the RCD Nexus RCC.
 - A second activity to organize additional mentorships (and/or a peer coaching program) is a much more substantial undertaking, requiring careful planning and dedicated resources to manage and run. This is a good candidate for consideration in a full CoE proposal for the RCD Nexus.

6. Related efforts, potential synergies

There are a number of activities that overlap at least in part with the goals of this workshop, and with the scope of recommendations made by workshop participants for a resource center. Those that we are aware of include:

EPSCoR CI Workshop Working Group

The EPSCoR CI Workshop (planned for Fall 2022) and an associated working group at CaRCC¹⁵. As the working group describes this effort:

States and Territories within the USA that are statistically “underfunded” by the National Science Foundation (NSF) fall within the NSF Established Program to Stimulate Competitive Research (EPSCoR), which typically funds large research and education projects at the State or Territory level to build local capability. Alignment of research support infrastructure (particularly cyberinfrastructure) at participating institutions is frequently decoupled from these funding events, and often reflects the level of strategic planning present at the campus scale (other types of institutions, such as some minority-serving institutions, have similar challenges). As part of an initiative to better align and increase long-term success of NSF-funded projects in EPSCoR jurisdictions, the RCD Capabilities Model team is specifically engaging the NSF-EPSCoR program with pilot assessments in order to refine the engagement model for institutions with EPSCoR characteristics. Expected benefits and outcomes of this initiative include better integration of cyberinfrastructure planning within the NSF-EPSCoR program itself, as well as heightened awareness of comparative capabilities within participating institutions.

This group has facilitated Bird-of-a-Feather sessions at PEARC20 and PEARC21 bringing together the EPSCoR-state RCD professionals and the broader RCD community [17], [18].

Connections: Several of the workshop coordinators are also members of this working group, and are working to coordinate these efforts.

AIHEC Cyberinfrastructure Strategic Planning Initiative

The AIHEC Cyberinfrastructure (CI) Team¹⁶ advances the STEM and education programs at the nation’s 37 TCUs by implementing a comprehensive CI capacity-building strategy that focuses both on the colleges’ STEM faculty and CI support staff. With support from external partners and regional institutions, this comprehensive CI strategy focuses on CI training, planning, and community-building involving both STEM faculty and TCU IT organizations,

¹⁵ <https://carcc.org/epscor-ci/>

¹⁶ <http://newweb.aihec.org/cyberinfrastructure/>, and <http://newweb.aihec.org/cyberinfrastructure-cisp/>

providing the resources, technical assistance and national network to advance participating TCUs toward CI-readiness and CI-enabled STEM research and education programs. The team is coordinating the AIHEC Cyberinfrastructure Strategic Planning (CISP) Initiative, “Developing a technology roadmap at the TCUs to support their academic, research, business, and public service missions.”

Connections: One of the workshop coordinators is engaged with this initiative, sharing insights and lessons learned between the two groups.

Emerging Centers track of the People Network

The Emerging Centers track¹⁷ of the People Network brings together members of research computing departments/aspiring centers that are just getting started at their institutions, research computing groups at smaller institutions, and folks who are new to the research computing and data community.

Note: An effort is underway to bootstrap a Strategy and Policy Facing Track for the People Network, in collaboration with CASC¹⁸ and the EDUCAUSE RCD Community Group¹⁹. This track would also gather community members with a strong interest in the issues we are addressing.

Connections: Workshop coordinators work closely with the People Network coordinators (including the Emerging Centers track) to share insights on community needs and feedback. One of the workshop coordinators is a Group Leader for the EDUCAUSE RCD Community Group, strengthening ties to that group.

Eastern Regional Network working group to Broaden The Reach

Smaller, mid-sized, and under-resourced academic institutions face unique challenges in providing resources needed to effectively support scholars and researchers. Smaller institutions — including Minority Serving Institutions, Hispanic-Serving Institutions, Historically Black Colleges and Universities, and Established Program for Stimulate Competitive Research institutions — that have compelling scientific research and education activities often lack the campus cyberinfrastructure (CI) and on-prem resources, funding, and expertise to support these activities.

To help overcome these obstacles in the northeast US, the Eastern Regional Network²⁰ (ERN) established a working group to Broaden The Reach²¹ (BTR). The ERN BTR working group held a workshop late last year to surface key issues in research engagement in addition to processes for planning and developing research CI at the campus level. The workshop gathered representatives from these smaller institutions to learn about their struggles and challenges and identify ways to help. Although this work focused on the Northeast US, smaller schools across the nation are faced with similar challenges.

Connections: One of the RCD Capabilities Model working group members is closely involved in this effort, and acts as a bridge to share information between the two efforts.

7. Acknowledgements

The RCD Nexus is supported as an NSF-funded Cyberinfrastructure Centers of Excellence (CI CoE) pilot ([award NSF-2100003](#)). This work was also supported in part by an RCN grant from the National Science Foundation ([OAC-1620695](#), PI: Alex Feltus, “RCN: Advancing Research and Education through a national network of campus research computing infrastructures – The CaRC Consortium”).

¹⁷ <https://carcc.org/people-network/emerging-centers-track/>

¹⁸ <https://casc.org/>

¹⁹ <https://www.educause.edu/community/research-computing-and-data-community-group>

²⁰ <https://www.enrp.org/>

²¹ <https://www.enrp.org/event/save-the-date-ern-broadening-the-reach-virtual-workshop/>

We also wish to acknowledge the contributions of the CaRCC RCD Capabilities Model working group members who contributed to the planning and execution of the PEARC21 workshop, including: Cathy Chaplin, Claire Mizumoto, Dana Brunson, Douglas Jennewein, Galen Collier, John Hicks, Patrick Schmitz, Scotty Strachan, and Tom Cheatham.

Finally, we extend our heartfelt thanks to the workshop participants for their engagement and contributions. They have significantly helped to shape the ideas that we hope to incorporate into the RCD Nexus Resource and Career Center.

8. References

1. Arafune, L., Brunson, D., Hacker, T., & Smith, P. (2021). *Building the research innovation workforce: A workshop to identify new insights and directions to advance the research computing community*. (p. 32). <https://www.rcac.purdue.edu/files/ciworkforce2020/report.pdf>
2. Berente, N., Ahalt, S., Bottum, J., Brunson, D., Cutcher-Gershenfeld, J., Howison, J., King, J. L., Neeman, H., Towns, J., Wilkins-Diehr, N., & Winter, S. (2019). The Professionalization of Cyberinfrastructure Personnel? *Proceedings of the Practice and Experience in Advanced Research Computing on Rise of the Machines (Learning)*, 1–6. <https://doi.org/10.1145/3332186.3332225>
3. Berente, N., Howison, J., Cutcher-Gershenfeld, J., King, J. L., Barley, S. R., & Towns, J. (2017). *Professionalization in Cyberinfrastructure* (SSRN Scholarly Paper ID 3138592). Social Science Research Network. <https://doi.org/10.2139/ssrn.3138592>
4. Berente, N., Howison, J., King, J. L., Ahalt, S., & Winter, S. (2018). *Organizing and the Cyberinfrastructure Workforce* (SSRN Scholarly Paper ID 3260715). Social Science Research Network. <https://papers.ssrn.com/abstract=3260715>
5. Briliyanti, A., Wilson Rojewski, J., Luchini-Colbry, K., & Colbry, D. (2020). CyberAmbassadors: Results from Pilot Testing a New Professional Skills Curriculum. *Practice and Experience in Advanced Research Computing (PEARC '20)*, 379–385. <https://doi.org/10.1145/3311790.3396619>
6. Broude Geva, S., Brunson, D., Cheatham III, T., Deaton, J., Griffioen, J., Hillegas, C. W., Jennewein, D. M., Krovitz, G., Magle, T., Schmitz, P., Tomko, K., & Wilgenbusch, J. C. (2020). Fostering Collaboration Among Organizations in the Research Computing and Data Ecosystem. In *Practice and Experience in Advanced Research Computing* (pp. 393–401). Association for Computing Machinery. <https://doi.org/10.1145/3311790.3396645>
7. Brunson, D., Cheatham, T., Yockel, S., Schmitz, P., & Mizumoto, C. (2021, May 19). *CI CoE: Demo pilot: Advancing Research Computing and Data: Strategic Tools, Practices, and Professional Development*. NSF Award Search: Award # 2100003. https://nsf.gov/awardsearch/showAward?AWD_ID=2100003
8. Brunson, D., Jennewein, D., Mizumoto, C., Schmitz, P., & Strachan, S. (2021). Building a Strategic Plan for your Research Computing and Data Program. *Practice and Experience in Advanced Research Computing (PEARC '21)*. Practice and Experience in Advanced Research Computing (PEARC '21). Retrieved 1/14/2022 from <https://drive.google.com/file/u/1/d/1KoN9cywFXF6tLY9l-WipX2Aa-lx6d-Ws/view>
9. Brunson, D., Krovitz, G., Mizumoto, C., & Schmitz, P. (2019). *Leveraging a Research IT Maturity Model for Strategic Decision-Making*. EDUCAUSE19. Retrieved January 14, 2022, from <https://events.educause.edu/annual-conference/2019/agenda/leveraging-a-research-it-maturity-model-for-strategic-decisionmaking-separate-registration-is-require>
10. CaRCC. (2021). *Capabilities Model Introduction and Guide to Use*. <https://docs.google.com/document/d/15xiDXMta7AIEvE6lpW4mvadAiW2PPshmBi73AVHTm9g>

11. Greenbaum, D., Guss, S., Rohrs, L., & Stringer, J. (2014). *Plan for the Future of Research and Teaching Technologies with Peer Benchmarking*. Retrieved January 14, 2022, from <https://events.educause.edu/annual-conference/2014/proceedings/seminar-08a-plan-for-the-future-of-research-and-teaching-technologies-with-peer-benchmarking>
12. Greenbaum, D., Rohrs, L., & Stringer, J. (2013). *NYU and UC Berkeley, Looking Outside to Improve Inside: Using Peer Benchmarking to Plan for the Future of Research and Teaching Technologies*. <https://www.cni.org/topics/assessment/f13-greenbaum-nyu>
13. Schmitz, P. (2021). Assessing the Landscape of Research Computing and Data Support: The 2020 RCD Capabilities Model Community Dataset. In *Practice and Experience in Advanced Research Computing* (pp. 1–8). Association for Computing Machinery. <https://doi.org/10.1145/3437359.3465580>
14. Schmitz, P., Gail Krovitz, Dana Brunson, Thomas Cheatham, Galen Collier, John Hicks, Claire Mizumoto, Karen Wetzel, & Alex Feltus. (2019). *Leveraging a Research IT Maturity Model for Strategic Decision Making*. Practice and Experience in Advanced Research Computing (PEARC '19). <https://pearc19.conference-program.com/presentation/>
15. Schmitz, P., Mizumoto, C., Hicks, J., Brunson, D., Krovitz, G., Bottum, J., Cutcher-Gershenfeld, J., Wetzel, K., & Cheatham, T. (2020). A Research Computing and Data Capabilities Model for Strategic Decision-Making. *Practice and Experience in Advanced Research Computing (PEARC '20)*, 77–84. <https://doi.org/10.1145/3311790.3396643>
16. Schmitz, P., Yockel, S., Mizumoto, C., Cheatham, T., & Brunson, D. (2021). Advancing the Workforce That Supports Computationally and Data Intensive Research. *Computing in Science Engineering*, 23(5), 19–27. <https://doi.org/10.1109/MCSE.2021.3098421>
17. Strachan, S., Bayrd, V., & Schmitz, P. (2020). BoF: *Preparing EPSCoR institutions for Research Computing and Data Capabilities Model engagement*. Practice and Experience in Advanced Research Computing (PEARC '20),
18. Strachan, S., Bayrd, V., Schmitz, P., Brunson, D., Veazey, P., & Jacobs, G. (2021). *Assessing and communicating cyberinfrastructure readiness at EPSCoR and under-resourced institutions*. Birds-of-a-Feather session at Practice and Experience in Advanced Research Computing (PEARC21). Proposal available at: <https://drive.google.com/file/d/1uBhhOBjZcPDbrAfSTr3DzRbl7TPhByAd/view>