

CASC Top Priorities: A Joint Effort Between Funding Agencies, Institutional Leadership, and the RCD Community

To build the robust, sustainable academic research computing and data ecosystem envisioned by CASC, the organization needs to work together with sponsoring funding agencies to focus on priorities that are relevant to the Research Computing and Data (RCD) community. The key concept to understand when approaching priority identification and setting in RCD areas is that success in setting and achieving priorities requires a joint effort between funding agencies and the community of RCD practitioners and providers. The alignment of these priorities among all participants should include mutual support and understanding of research community goals on the part of the institutional leaders of the universities and laboratories that pursue such research, along with effective communication of these priorities throughout this entire chain of participants.

CASC plays a key role in this process, by design, as described in its organizational mission statement to pursue its vision of a robust, sustainable ecosystem supporting academic research computing and data services, enabled by a vibrant, diverse community of professionals. This mission is to:

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

As described in its published organizational description, mission, and vision statements, these goals include: accelerating scientific discovery for national competitiveness, global security, and economic success; developing a diverse and well-prepared 21st-century workforce; enabling rapid calculations to address large-scale computational challenges, managing and analyzing extensive research data sets, and creating insightful visualizations. CASC carries out a variety of activities within its meetings and communications with member institutions to identify topics of interest, supplementing these activities with initiatives to sample opinions of the broader research community, including workshops, formal surveys, and other research methods, conducting such reviews regularly.

In pursuit of these goals, CASC conducts internal reviews and external surveys of top priority topics within the community. This report summarizes efforts conducted over the past year by CASC, in keeping with the above mission, to identify and gain clarity on priority actions in several important areas in which improvements in priority alignment and focus are needed. Before going into the key findings, challenges, and recommendations, we begin with a review of the process for identifying top priorities, in general, in ways that will produce good alignment between federal, state, and private funding agencies, university and laboratory facility institutional leadership, and the RCD community of practice itself.

Overview of Report Process

This report is the result of an internal CASC solicitation that identified ten top Research and Development (R&D) priority areas, then refined these by a survey asking members to rank these by importance. The top-rated topics were discussed in a set of focus groups, conducted by videoconference, with each topic reviewed by two different focus groups. Summary recommendations and challenges identified by these groups were combined to

produce the sections of this report, which were then reviewed and edited by the CASC executive and positions committee members for consistency and clarity.

Alignment of Funding, Institutional, and Community Needs

As described above, the CASC mission includes goals to serve as a trusted advisor to funding agencies in the development of programs, to act as a partner with these agencies in the development of impactful programs that support computational science, and to ensure that these programs include the components needed to build a capable and diverse national cyberinfrastructure (CI) workforce. CASC can serve to represent its members in this partnership while endeavoring to facilitate participation by community members who do not yet have effective avenues of communication, and can work with community members to develop avenues for use in the future. Such considerations span multiple topic areas and are likely to apply to future priority-setting reviews, so they are presented here separately on a general basis.

Why it Matters

Community input should be a valued part of the process of defining and setting funding priorities. CASC provides an important voice for the community by representing a broad coalition of members from a range of institutions that support and drive the success of computational science and data-intensive research. Establishing alignment between community and funding agency priorities should be a two-way process. Participating in developing national and regional priorities represents opportunities for the community to understand, align with, and support the agencies, and in return, the community can provide vital input to the conceptualization, implementation, and governance of programs. If the research community, including CASC, fails to contribute as a partner to strategic initiatives, relevant agencies may be insufficiently informed. Additionally, other voices less well connected with the community may create incomplete understanding that can produce a misleading influence, resulting in the RCD community missing out on opportunities to support success.

Maintaining healthy alignment between the RCD community and the funding agencies also supports critical collaborative initiatives when time is of the essence. If such participants establish an understanding of each others' practices and maintain mutual trust, this can make a response to critical issues both faster and more effective. In the recent example of the COVID-19 pandemic, exceptional work to support research was developed rapidly and supported by the COVID-19 HPC Consortium. As noted in a recent National Science and Technology Council report (cite), there will likely be other critical emergent situations that require urgent computational sciences support. Fostering strong alignment between funding agencies and the RCD community can enable the possibility of deploying timely breakthrough computational and data-intensive research capabilities in areas of high societal importance.

As a representative body whose membership is deeply based in the RCD community, CASC has an intrinsic interest in supporting initiatives to develop, diversify, and train the associated workforce. A number of programs aimed at improving the pipeline of recruiting and training workers from an expanding range of sources are in process or in development, and community input on the development of new programs can bring benefits and real improvements to our workforce.

The CASC membership represents a reserve of crucial knowledge of best practices for developing and supporting diversity, equity, and inclusion (DEI) initiatives needed to establish such workforce training and development goals. Members of the community can draw on their own experiences from local initiatives to guide effective measures in promoting DEI goals to enhance CASC as an organization and contribute such

knowledge to the national conversation. The CASC community can also leverage contacts within Human Resources (HR) and Labor Relations scholarship to facilitate recommendations based on current research on workforce development and diversity.

Finally, improving our own community's understanding of agency motivations and incentives will help the CASC membership identify and communicate success stories in a timely way back to agency stakeholders and to communicate the joint accomplishments of funding agencies and researchers. Identifying computational science successes and advances supported by such activities can become a self-sustaining cycle of good programs supporting achievable results. Improving the quality and accuracy of information transmitted to lawmakers and other policymakers supports both the ability of research sponsors to obtain program funding and the ability of the RCD community to communicate impactful results through programs that are implemented and governed in robust, productive, sustainable ways. Ideally these steps should be carried out with good communication flow both internally, within institutions between leaders and researchers, and externally in communicating relevant considerations to agency officials and policy leaders.

Current Challenges

Challenges change with time, but a current sampling is sufficient to illustrate the need for good communication and continued efforts to pursue the alignment of approaches to research needs.

Uneven Understanding of Current Problems and Available Solutions

The first challenge to achieving good alignment for priority decisions is to build consensus on priorities within the RCD community itself. Discussions within our community have shown that the CASC membership currently has a somewhat uneven understanding of how currently available vehicles for comment work, where and how they can contribute, the composition and characteristics of the existing network of related organizational interfaces with funding agencies, and where communication can be most effective.

Since CASC members come from a wide variety of backgrounds with different experiences of working with agencies, the organization should maximize its ability to share and learn from each other. Pursuing this opportunity requires understanding where individual member activities versus those of the organization can improve mutual communication and at what point in the development of funding agency programs can our individual and collective inputs have the most impact.

Challenges Specific to the COVID-19 Pandemic

The CASC membership has noted that changes in administrative and social practices during the COVID-19 pandemic have been substantial. Traditional ways of interacting, such as in-person priority-setting meetings and workshops, are often limited or no longer possible. This yields the opportunity to re-examine these previous methods to see if they have shortcomings, particularly in the areas of diversity, equity, and inclusion, that can be remedied or addressed using new methods. Even once the pandemic abates, maintaining good contact as a community with funding agencies should remain a priority and we should be open to developing new methods of communication.

Challenges Related to Workforce Development

Additional challenges for institutions center around the development of a diverse and inclusive workforce. Funding solicitations frequently require proposers to include components to develop and improve the RCD workforce, but do not generally include adequate funding to achieve these goals. DEI initiatives can therefore

fall under invisible labor or unfunded mandates within institutions and funded programs. Experience shows that there is an uneven distribution of expertise in successful DEI initiatives. Researchers have few avenues to learn and leverage the lessons learned for new projects.

As a result of these challenges, current DEI efforts in the RCD community tend to be based on individual perceptions of useful methods, rather than on a common set of approaches proven to be successful by prior efforts. Both funding programs and institutions could benefit from re-examining requirements for successful delivery of activities related to DEI goals.

Sustainability Issues

Throughout the community and with a renewed emphasis by funding agencies, sustainability for projects continues to be a focus, despite the rarity of successful models for achieving and maintaining sustainability. Finding sustainable solutions remains a competency still under development, and there is no common formula for achieving sustainability. To support sustainable cyberinfrastructure initiatives, researchers, institutions, and programs should work together to identify conditions and share models and plans for developing these further. A critical component of sustainability, which is made more pressing by increasingly strict data retention requirements, is that of a multi-disciplinary data storage, reuse, discovery, and sharing capability for the community.

Balance Between CI Innovation and RCD Production Resources

The CASC membership has noted a central tension between programs aimed primarily at developing forefront computing systems and those aimed at providing general large-scale computational capacity to support RCD-intensive research. While some solicitations by federal agencies focus exclusively on the development of innovative systems that push the boundaries of computational theory and methods, programs are also needed to provide production facilities aimed to provide sufficient capacity, reliability, and uptime to support a broad base of research users. It is not clear that there is sufficient financial support within existing programs to offer simultaneously high-capacity production facilities that support domain-specific programs of research while retaining a high level of innovation opportunity to develop cutting-edge systems.

For the nation's overall computing research program to be successful, there needs to be a continuing effort to balance programs funding forefront systems and research in computer science compared with those ensuring support for sufficient capacity, stability, and performance of production facilities. In the absence of such planning, tension will continue to exist between achieving state of the art advances in computational methods and delivering raw computing and data-intensive facility capacity to serve as a basis for other fields. This dichotomy should be resolved in ways that aim to achieve both sets of goals, rather than favoring one of these extremes of the research spectrum over another.

It is important to note the role of institutional on-premises RCD facilities in achieving such goals in both domain-specific research and capacity computing areas. CASC member organizations have competencies in both areas, since they typically support both forefront computational research teams and a variety of production resource facilities that provide significant capacity in aggregate across the nation compared to large-scale federal projects.

Timeliness in Developing Contributions to Research Program Calls for Input

Finally, the community faces a challenge in preparing input to funding agencies in a timely manner. CASC needs to develop input with the due reflection necessary to make quality suggestions, communicate well with the

community to represent a consensus or at least a broad representative sampling of views, and effectively identify vectors for input at critical stages in the process. Currently the best we have been able to do is to develop rapid responses to some urgent requests for comments, but this model may be insufficient, and is a reactive tactic rather than a strategic one.

Vision of Success

A vision of success follows from the challenges posed above. CASC should pursue a process that positions the organization to deliver the expertise of its membership at the forefront of developing initiatives that can then become well thought out programs and allow the funding agencies to make well balanced, effective, and well-informed decisions. This document is a step toward preparing such input, even in advance of agency requests.

First, a successful alignment between federal agencies and CASC would be manifested in a relationship in which CASC is a valued contributor to the Networking and Information Technology Research and Development (NITRD) and Office of Science and Technology Policy (OSTP), which provide the advice that drive programs across the funding spectrum. CASC would also be seen as a vital contributor to key executive branch agencies, including NSF, NIH, and DOE. CASC membership would be able to provide expertise that is respected both as an organization and through the contribution of individual members to advisory panels, reviews, workshops, and policy organizations. An even stronger version of success for CASC would result in the organization maturing to a similar level of regard as professional organizations such as American Association for the Advancement of Science (AAAS) and Association of American Universities (AAU), which bring together their respective communities for joint work and serve as a voice that is representative of a broad range of perspectives.

Collecting input from the community for funding, policy, and advisory organizations will help establish beneficial relationships. A collaborative relationship between funding agencies and community members will allow institutions to understand the needs, incentives, and metrics of the funding agency representatives and the stakeholders that have influence over them. The vision outlined above for interactions with federal funding agencies also applies to state, local, private foundation, and industry-based funding sources. A healthy and informative conversation with these partners will enhance the range and scale of potential initiatives while providing additional perspective and adding context to the information available to the CASC membership.

Contingent to CASC providing salient and useful information to these entities, and to ensure that communication can be effective both from CASC and individual members, CASC should provide active space for ongoing discussion. To establish a common understanding of membership positions, such discussions should be an ongoing membership activity that continues beyond member meetings. These activities should allow opportunities to build group consensus and identify areas that may not apply similarly across the membership.

An effective mentorship program within the CASC membership can help improve and guide these discussions further by nurturing healthy inter-organization conversations and facilitating mutual understanding where concerns diverge or levels of expertise differ within the membership. These activities will help improve CASC contributions as well as consultations with the research sponsors and the broader RCD community.

Recommendations and Next Steps

After conferring with the membership, we identified several steps needed to improve the relationship between CASC and the funding agency community. These steps are explicitly intended for CASC and its member institutions to pursue, so are not broken out for this section as separate recommendations for the different target

audiences (CASC member institutions, research sponsors, and the CASC organization itself) as is done for specificity in the subsequent reports in this series.

Establish and Maintain Processes for Timely Input

In consultation with CASC member institutions, CASC leadership and the positions committee develops CASC position papers and produces reports on current and future initiatives, challenges, and needs. The organization should establish a more nimble process for gathering feedback from the membership.

In addition to developing such documents and responding to requests for input from funding agencies, a proactive approach such as the one exemplified by this current report should be implemented to produce community output ahead of agency requests. Such reports should describe issues of interest, identify emerging needs, offer proactive evaluations, and bring valuable insights to both the funding agencies and to the RCD community. This process should be designed to position CASC member input as integral to advancing conversations on important national CI topics.

Bolster Communication Channels with Agencies and CASC Membership

CASC leadership is in the process of recruiting an Executive Director who will serve as a channel between the organization and agencies, provide on-the-ground information and feedback on critical initiatives, and work closely to coordinate the efforts of the Executive Committee. Establishment of the Executive Director as a critical contributor to CASC priorities will help recruit, gather, align, and focus CASC member input. CASC leadership should also take the opportunity at CASC meetings to familiarize the membership with the means and opportunities for offering individual and organizational input to both CASC and other organizations, including requests for comment, serving on committees at the agencies, and participating in program and proposal reviews. CASC should continue the conversation on critical issues to our community by establishing discussions within its email list and discussion groups, as well as at member meetings.

Improve Intra-Institutional Communications

Each member of the CASC community should take seriously the importance of improving their own understanding of relevant issues, and communicating these within their own institutions. Partnerships in many areas including DEI initiatives take time to develop and require continuing nourishment, care, and curation to produce good results in the future. For this reason, CASC should also ensure that information on existing opportunities for input or funding are well understood by community members, both within and outside of CASC. Improving community understanding and awareness in this way will ensure the best possible conditions for enhancing communications on priorities to the funding agencies.

Facilitate Dialogue With Industry

Finally, CASC should identify opportunities for engaging industry and establish points of contact, including inviting talks and panels that include industry leaders as well as providing industry with opportunities to learn and gain input from CASC on topics of importance to the advancement of the RCD community. Industry capabilities play a key role in determining what's possible as well as future directions for hardware and software resources.

Conclusions

In the report above, CASC presents recommendations for actions to be taken by its member institutions and by the organization as a whole to pursue improvements in aligning funding agency, institutional, and RCD community needs, based on priority issues that emerged from focus group discussions and surveys of the CASC membership. CASC anticipates making further recommendations on top priority areas in the future. In the meantime, implementing the recommendations in this document will produce material benefits to CASC institutions, individual researchers and partners, and the overall program of RCD-related research.