

## ICS Workshop Position Paper from CaRCC – “Workshop on Best Practices and Tools for Computational and Data-Intensive Research”.

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CaRCC – the Campus Research Computing Consortium (<https://carcc.org>) – is an organization of dedicated professionals developing, advocating for, and advancing campus research computing and data (or research IT or cyberinfrastructure) and associated professions. Current focus areas include defining and connecting the broader research computing and data ecosystem (including communities such as CASC, Campus Champions, XSEDE, OSG, RDAP, HPC-syspros, among others), CI professionalization, career and workforce development, and defining stakeholders and shared value propositions for the community at a time of accelerating change. At present CaRCC is defined by the **people-network** focused into various “facings” including researcher-facing, systems-facing, stakeholder-facing, data-facing, and software-facing. Focus areas are supported by active and volunteer working groups who collectively work to generate associated products, such as a CI professionalization wireframe, campus research computing and data job families, responsibilities, and career track, a research computing and data maturity model across multiple dimensions and facings, among others. As of May 2019, three facings (research, systems and data) have monthly calls on topics of interest and most of the working groups have Zoom meetings every two weeks.

Aware CaRCC participants see that the needs for support and expertise for researchers with their research computing and data needs on campuses is growing and diversifying, and this is mainly happening on our campuses. Moreover, the research computing and data needs of researchers is very distinct from typical services provided by enterprise or central IT (who have more limited services and staff whose focus is on a single technology, software, or service offering). In contrast, many of our small research computing and data support shops have morphed from focused high performance computing (HPC) service offerings in specialized domains (such as computer science, chemistry, and physics) to now support all domains with needs beyond the desktop ranging from HPC to virtual machines and the cloud, from rich software modules to facilitate building applications to new container modalities, to diverse storage and specialized instruments, and into new areas (data movement and science DMZs, security and compliance, big data analytics and machine learning). This results in an inverted pyramid of IT staff development from focused to on one domain or technology to broad experience across a multitude of service offerings and requirements.

Critical in this mix is the clear need for researcher-facing people who can bridge between the researchers and the technology or services and who can train researchers on these technologies. Significant and common concerns or themes that have emerged are, how can we sustain this growth in demand and also sustain the increasing complexity and diversity of service offerings and technologies? How can we support new and less experienced science domains? How can we stay aware of current trends, leading practices, and common challenges? One way is to work together to share resources and expertise. Sustaining the ever-expanding CI ecosystem will require creative solutions that span from campuses to regions to the nation with a diversity of funding approaches.