ACTION ITEM #5

Establishment of Research Center for Institutional Research Computing (CIRC) (Daniel J. Bernardo)

September 16, 2016

TO ALL MEMBERS OF THE BOARD OF REGENTS

SUBJECT: Establishment of Research Center

PROPOSED: That the Board of Regents establish the Center for Institutional Research Computing (CIRC)

SUBMITTED BY: Daniel J. Bernardo, Provost and Executive Vice President

SUPPORTING INFORMATION: Research computing is at the heart of simulation and data science, helps expand the frontier of scientific knowledge, fuels the engine of discovery, and underpins the national research enterprise at all levels. Specifically, research computing and its supporting cyber-infrastructure cut across all aspects of Washington State University's (WSU) research activities and are critical to its vitality, impact, growth, and national competitiveness. While research computing is pivotal to all aspects of WSU's research enterprise and is pervasive across virtually all its programs, it lacks both a "home" with a strong and visible identity and the unifying "voice" necessary to coordinate, integrate, and represent the needs and interests of the University's research community at large. Consequently, the fragmentation of WSU's research computing programs often result in lost opportunities – as well as a diminished ability for the University to enhance its position of national leadership in this area.

To fill this gap, and to integrate research computing into appropriate research activities across the WSU system, the Office of Research proposes the establishment of the WSU Center for Institutional Research Computing (CIRC) – a coordinating organization to advance and promote high-performance research computing with a focus on application domains aligned with the University's enduring and emerging areas of academic strength. The vision for CIRC is to propel WSU into a positon of enhanced leadership in the field of research computing by (1) unifying the research community around shared and strategic institutional goals and (2) leveraging cyber-infrastructure

resources across the WSU system to advance state-of-the-art simulation and data science.

The long-range goals of the CIRC are to:

1. Enhance WSU's leadership in scientific and data-intensive computing research, innovation, discovery, and education; and propel WSU into a leadership position in the field of simulation and data science among public universities and peer institutions;
2. Establish WSU as a pre-eminent destination of choice for researchers to advance the state-of-knowledge in the fields of scientific computing and data-driven science and apply their power to further WSU academic strengths, priorities, strategic goals and objectives, and regional and national impact;
3. Grow WSU into a hub for innovation, entrepreneurship, and economic development in the Northwest (NW) region through strategic partnerships with regional national laboratories, leading academic institutions, advanced technology providers, and the WA state and NW-regional industrial sector; and
4. Deploy and efficiently manage a unified cyber-infrastructure by integrating the needs and requirements of the academic and research community throughout the entire university system to promote the principle of "one initiative/one university" across its geographically distributed campuses.

Three core strategies support the CIRC goals:

1. Applications: An initial focus on advancing scientific application domains representing existing and emerging areas of academic and research strength at WSU;
2. Responsive Research Cyber-infrastructure: The deployment and governance of a responsive research cyber-infrastructure through the implementation of a sustainable acquisition strategy and an institutionally supported management model; and
3. People, Alliances, and Partnerships: The attraction of leading faculty, the enhancement of training and education, and the pursuit of strategic partnerships and regional alliances with universities, national laboratories, technology providers, and appropriate industrial sectors.

Finally, the CIRC organizational structure will promote active stakeholders' participation and its operation will be consistent with the WSU IT Governance Model.

This recommendation was passed by the Faculty Senate on February 11, 2016.

Attachments: *Center for Institute Proposal – May 2016 Board of Regents Supplemental Information and Center for Institutional Research and Computing*

Center or Institute Proposal - May 2016 Board of Regents Supplemental Information

Title of Proposed Center or Institute	Center for Institutional Research Computing
Name of Primary Point of Contact (POC)	Aurora Clark, Department of Chemistry
POC Telephone Number	(509) 335-3362
POC Email Address	auclark@wsu.edu
Resources for Personnel and Operations *(include the funding source)*	Years 1-5 25K administrative stipend of Director - VPR 20K 0.5 FTE Program Coordinator - VPR 85K 1.0 FTE Computational Scientist - CAS, CAHNRS, VPR 25K 0.5 FTE Financial Analyst - VPR 30K Operating costs (workshops, seminars, travel) - VPR
Facilities *(include the funding source)*	Kamiak - a HPC research computing condominium style cluster. Sponsors of Kamiak include CAS, CAHNRS, and VCEA. Faculty investors purchase computer nodes for their own research
Sustainability Plan Post 5 Years *(e.g. what are plans if sustainability goals are not achieved?)*	After the 5-year period the Center will be evaluated according to the metrics of funding, publications, student education and training and user base. A cost to refresh Kamiak is being assembled and provided to all Sponsors by July 2016. The formation of the Center will enable competitive pricing negotiations for equipment in the cluster which will enhance the likelihood of having enough users to support long-term sustainability. During the initial 5-year period, the Center will also submit several MRI (major research infrastructure/instrumentation grants to organizations like NSF). The Center is also working with PNNL and UW to create regional computing resources for faculty at WSU. If for some reason the sustainability goals are not achieved in 5 years, there will be a gradual sunset of institutional investment by CAS, CAHNRS, VCEA and the VPR to allow faculty and researchers to transition back into their prior research models that encompassed individual faculty management of their own equipment for research.

Center for Institutional Research Computing

Research computing is at the heart of simulation and data science, expanding the frontiers of scientific knowledge, fueling the engine of discovery, and underpinning the national research enterprise at all levels. *It accounts for over $20 Mil of externally funded grants At WSU since 2014.* The CIRC will integrate research computing into research activities across the WSU system, advancing and promoting high-performace research computing with a focus on application domains aligned with the University's enduring and emerging areas of academic strength. CIRC will oversee institutionalized research tools (the Kamiak computing cluster) and provide a "voice" to the faculty and researchers that utilize high performance computing and data-intensive analytics within their research endeavors.

Applications and Research: CIRC will initially focus on advancing scientific application domains and research that represent existing and emerging areas of academic and research strength at WSU.

- Expanded opportunities for interdisciplinary/collaborative research via CIRC-facilitated grant proposals/ publications
- Coordinating extramural funding for supporting research activities within with the CIRC portfolio
- The research portfolio of CIRC will include: Smart Energy Grid (power system analysis, demand management), Genomic, Genetics, Bioinformatics, Agriculture (big data analysis for smart farming), Health Sciences (systems oharmacology), Materials Science and Engineering, Chemistry and Biochemistry, Computational Physics, Atmospheric and Environmental research (e.g air quality forecasting, earth system modeling)

Responsive Research Cyber-infrastructure: CIRC will manage the deployment and governance of a responsive cyber-infrastructure that has a sustainable acquisition strategy and institutionally supported management.

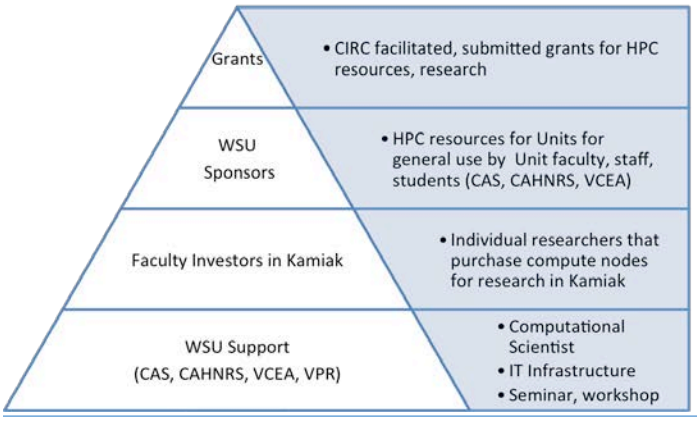
- **Kamiak** – a high-performance computing platform for production/capacity computing
- Implementation, installation, development, and optimization of software on modern HPC platforms and transference models for software onto leadership class supercomputing architectures.
- Advanced testbed architectures for research and capability computing
- Condominium and community-based, shared and centrally managed scalable compute and storage services.
- High-speed/high-reliability research networks to integrate the WSU geographically distributed campuses.

People, Alliances, and Partnerships: CIRC will help in faculty recruitment, the advanced training and education of undergraduate and graduate students, and the pursuit of strategic partnerships and regional alliances with universities, national laboratories, technology providers, and appropriate industrial sectors.

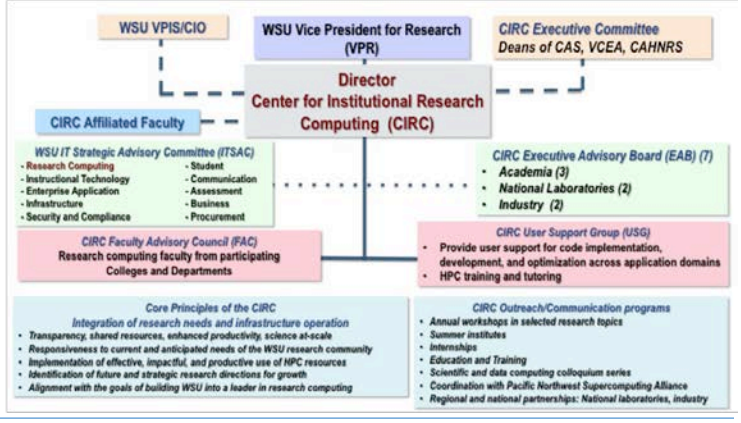
- Internships for students in industry and national laboratories
- Outreach – workshops, summer schools, seminar series
- Training and education in computational and computer science

---

CIRC Funding Sources



CIRC Org Chart



Point of Contact: Professor Aurora Clark (auclark@wsu.edu) for more information.

Center for Institutional Research Computing

Sustainability: High performance computing is an institutional resource that is recognized by all of our peer institutions to be of major importance to the research enterprise. At its heart, sustainability in this context, can be defined as value added beyond the institutional investment. Computing is the sole research tool amongst the 21 initial faculty investors in Kamiak, however this is less than 50% of the total faculty that use computing within their research programs. From social science, to materials chemistry, catalysis, and economics – computing currently plays an integral role in the research fabric of WSU.

The major investment has been associated with the hardware and support associated with the WSU Kamiak Research Computing Cluster (Kamiak), the a shared high-performance computing (HPC) cluster dedicated to research computing at WSU deployed to the research computing community since early 2016. The 21 initial investors in Kamiak have more than ***$20 Mil in funded grants from 2014-2016, and $24 Mil in pending grants for 2016 to date that have been enabled by the presence and support of the central Kamiak computing resource***. However, the Kamiak Cluster was funded with various capital, one-time funds. No permanent, long term maintenance and operational funding was identified to maintain this WSU strategic research initiative beyond two (2) years. In order for the CIRC program and critical research projects to be successful into the future, an ongoing source of funding must be identified for maintenance and infrastructure refresh cycles.

A recent report from the Coalition for Academic Scientific Computing (CASC) has summarized the average level of support for centralized computing facilities across 47 US Universities (Fig. 1). WSU's research computing resources can be classified in the "small" category (with 27 other Universities). On average University support is 77% for the computing resource. The initial WSU investment in the procurement of Kamiak and 2 staff positions to support it was $3 Mil. Faculty investors then purchase their own "computing nodes" to populate the cluster for their own research needs.

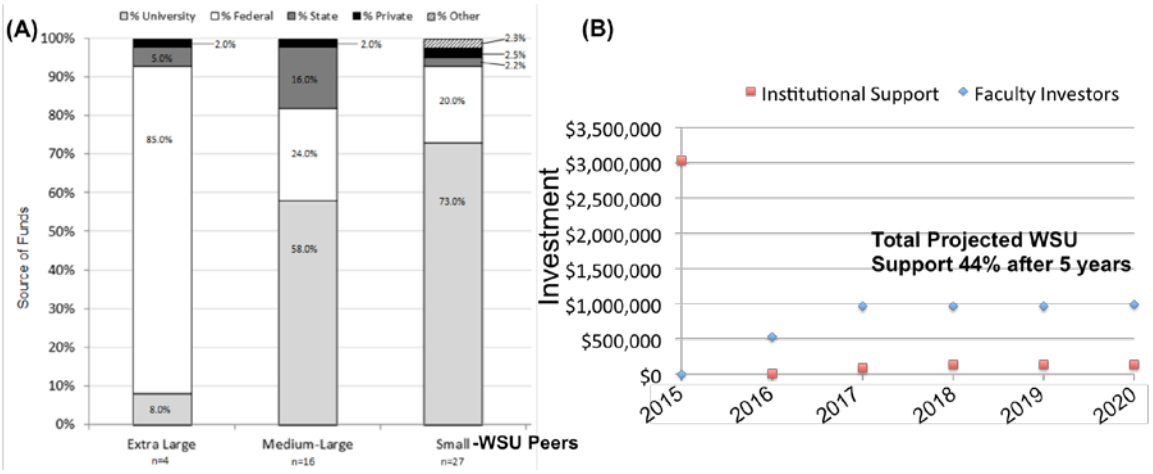


Figure 1. (A) Level of support (in %) for University computing resources and their source amongst 47 US Universities, from CASC report. (B) Investment from WSU stakeholders in Kamiak over 6 years.

Under current agreements with ITS, the VPR, and supporting Colleges, the University as a whole will only be supporting Kamiak at a level of 44% after a 5 year period. Thus, three options for funding the longevity of the CIRC have been considered by the leadership of ITS, the VPR, other leadership and stakeholders. The supported model is one of a Central Funded or Shared Services Methodology whereby impacted groups or stakeholders provide some budget reallocation to a central fund. This process is ongoing, however the respective units are working together to make this a reality.

Metrics: CIRC is already collecting usage statistics and grant information for faculty investors in Kamiak. Means to track publications, students trained, student placement after degree, and collaborations are currently being implemented. These metrics associated with success are well-defined as compared to our the research computing capabilities and metrics of our peer institutions.