

The OneOklahoma Cyberinfrastructure Initiative: A Model for Multi-institutional Collaboration

A White Paper submitted by the OneOklahoma Cyberinfrastructure Initiative membership to the National Science Foundation Workshop on The Role of Regional Organizations in Improving Access to the National Computational Infrastructure

The OneOklahoma Cyberinfrastructure Initiative (OneOCII) is a statewide all-inclusive advanced digital services collaboration that has been providing access to Cyberinfrastructure (CI) resources, as well as expertise and education, so far to over 100 institutions and organizations statewide (over 50 academic and almost 50 non-academic), including PhD-granting universities, primarily undergraduate institutions, community colleges, career techs and high schools, among them 10 Minority Serving Institutions (MSIs).

OneOCII, originally named OCII, began with Oklahoma's 2008 National Science Foundation (NSF) EPSCoR Research Infrastructure Improvement (RII) Track-1 project, as a Memorandum of Understanding (MOU) between the University of Oklahoma (OU) and Oklahoma State University (OSU) to share their CI resources not only with each other but to all non-commercial researchers and educators across the state. Prior to this, the state of Oklahoma had limited CI resources, primarily at OU and just emerging at OSU. As of September 2015, Oklahoma has over 200 TFLOPs offered by five institutions, including OU, OSU, the Oklahoma Innovation Institute (OII, a nonprofit in Tulsa), Langston University (Oklahoma's only Historically Black College/University) and the University of Central Oklahoma (UCO), a primarily undergraduate institution, as well as an emerging multi-institutional Science DMZ known as the OneOklahoma Friction Free Network (OFFN), with substantial resource upgrades anticipated at OU and OSU by 2016. All of the OneOCII server provider institutions communicate consistently via weekly conference calls, an email list, and an all hands meeting at the annual Oklahoma Supercomputing Symposium, the oldest CI conference held annually in an EPSCoR jurisdiction.

The primary goals of OneOCII are: (a) to reach institutions outside the mainstream of advanced research computing; (b) to serve every higher education institution in Oklahoma that has relevant curricula; (c) to educate Oklahomans about advanced computing; (d) to attract underrepresented populations and institution types into advanced computing. These goals are accomplished through a variety of methodologies including:

- Access to supercomputers and related technologies (25 OK academic institutions to date.)
- Dissemination: The Oklahoma Supercomputing Symposium annual has served 311 institutions and organizations (112 academic institutions in 27 states including 32 in Oklahoma, 143 commercial, 36 government, 20 nongovernmental).
- Education: The "Supercomputing in Plain English" workshop series has reached 362 institutions in 51 US states and territories and 17 other countries (16 OK academic).
- Faculty/Staff Development: Workshops are held annually at OU and OSU on advanced computing and computational science; topics have included parallel computing, computational chemistry and bioinformatics (18 OK academic).
- Informatics: Research facilitators are embedded in specific research projects and are largely funded by those projects (2 OK academic).
- Outreach: "Supercomputing in Plain English" overview talk; Oklahoma EPSCoR Women in Science hands-on booth (24 OK academic).
- Proposal Support: Letters of collaboration for access to OneOCII resources; collaborations with OneOCII lead institutions; guidance in both proposal content and submission (4 OK academic).
- Stewardship: Research data stewardship initiative, led by Libraries at multiple institutions.
- Technology: Obtain, or help acquire, technology for institutions statewide, including HPC clusters, network upgrades, mini-supercomputers, HiDef video cameras (14 OK academic).
- Workforce Development: Oklahoma STEM Mentorship program: "A Day in the Life" presentations and job shadowing opportunities (39 OK academic).

OneOCII has facilitated over \$165M in external research funding to Oklahoma investigators, including over 200 research projects at Oklahoma institutions. OneOCII was specifically required to successfully fund over \$42M of external grants, including several CI grants, among them:

- five NSF Major Research Instrumentation grants at OU, OSU (2), Langston U and UCO;
- an NSF CC-NIE award for OFFN shared among OU, OSU, Langston U, OII, UCO (pending NSF approval), OneNet (Oklahoma's state research, education and government network);
- two NSF CC*IIE awards involving OU, OneNet and the Great Plains Network;
- an NSF EPSCoR RII Cyber Connectivity (C2) grant, the "Oklahoma Optical Initiative," shared among OU, OSU, Langston U, University of Tulsa, the Samuel Roberts Noble Foundation (a rural nonprofit research institute), and OneNet, and also serving Bacone College (MSI), the College of the Muscogee Nation, Comanche Nation College and Pawnee Nation College.

OneOCII's approach is to run as informally as possible, with all affiliations purely voluntary. Institutions participate not only because they perceive direct and tangible benefits to their own researchers and educators, but also because the mission of OneOCII aligns with state and national objectives. As a result, the OneOCII email list and weekly calls currently include 73 members, representing faculty, researchers, CI practitioners, and librarians across 19 academic, government and nonprofit institutions. CI leaders in other states have expressed interest in adopting and adapting the Oklahoma model; specifically, groups are forming in Kansas and West Virginia based on OneOCII.

Recommendation: The NSF should incentivize informal and formal consortia based on models such as Oklahoma's (e.g., Louisiana, Ohio and Florida have successful but quite different approaches). These would require constant, consistent, ongoing collaboration. The breadth and depth of engagement should continuously expand through a variety of communication channels, and sharing of both human and physical resources. These collaborations should be encouraged to provide education, outreach and training opportunities to all relevant institutions, and to foster each other's growth in providing CI resources to their stakeholders. Not only will this increase the number and effectiveness of CI practitioners, it will also help provide avenues for mentoring future CI leaders. While a consortium's leadership might come from a single institution at first, the goal should be to mentor other institutions to develop leadership roles across the consortium, to maximize robustness, resiliency and impact.

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