Extended Abstract: Northeast Cyberteam - Methods, Results and Expansion via the Cyberteam Portal

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***Abstract*— Computing has become an essential component of research and education for nearly every scientific discipline. Meeting the need for support staff who can help faculty make the best use of available computing resources is a significant challenge for small and mid-sized institutions. The NSF-sponsored Northeast Cyberteam is addressing this challenge by building a pool of research computing facilitators that can be shared across institutional boundaries while also developing self-service tools that reduce the support burden.**

The Cyberteam Portal, developed to support the Northeast Cyberteam has enabled adoption of program methods by other communities of practice and collaboration with the broader research computing community.

Keywords— workforce development, research computing facilitator, project portal, Ask.CI, MGHPCC, Northeast Cyberteam

I. The Northeast Cyberteam Program

Cyberinfrastructure is as important for research in the 21st century as test tubes and microscopes were in the 20th century. Familiarity with and effective use of cyberinfrastructure at small and mid-sized institutions is essential if their faculty and students are to remain competitive. Now in its final year, the Northeast Cyberteam Program [1,3,4] is a 3-year NSF-funded, regional initiative to increase effective use of cyberinfrastructure by researchers and educators at small and mid-sized institutions in Northern New England, by making it easier to obtain support from Research Computing Facilitators (RCFs). The program combines direct assistance to computationally intensive research projects; experiential learning opportunities that pair experienced mentors with students interested in research computing facilitation; sharing of resources and knowledge across large and small institutions; and tools that enable efficient oversight and possible replication of these ideas in other regions.

RCFs combine technical knowledge and strong interpersonal skills with a service mindset and use their connections with cyberinfrastructure providers to ensure that researchers and educators have access to the best available resources. It is widely recognized that RCFs are critical to successful utilization of cyberinfrastructure, but in very short supply [2]. In our experience, this is currently the most significant barrier to productive use of research computing at small and mid-sized institutions.

To help meet the need, and to leverage professional RCFs while also developing a next generation workforce, the Northeast Cyberteam Program provides direct support to faculty at small and mid-sized institutions by launching projects that pair a student with a professional mentor to address an immediate faculty need. Projects draw mentors and students from across the region. We have launched 42 projects at 21 institutions to date, pairing a diverse population of student RCFs with knowledgeable mentors to assist researchers and educators in the region. Concurrently, we have developed a self-service learning toolkit, described below, to provide timely access to information when it is needed.

Program direction is set by a Steering Committee composed of leaders from each of the larger institutions that serve as anchors for the Northeast Cyberteam: University of Maine, University of New Hampshire, University of Vermont and MGHPCC; a program manager who coordinates day to day activity; and key personnel from a few other institutions that provide a source for students and mentors. The Steering Committee as a whole approves all projects undertaken. For selection of projects, the Steering Committee relies less on competitive applications (though merit will naturally play a role), and more on outreach to faculty at smaller institutions who can benefit from access to cyberinfrastructure but are either unaware of available resources or have given up after a poor experience. Care has been taken in sourcing and monitoring projects to ensure that they lead to results that might not otherwise have been achieved, and blaze trails that others can follow.

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II. Knowledge Sharing and Self-Service Learning Resources

Providing tools to enable self-service learning is a key to our strategy of developing facilitators through experiential learning, recognizing that one of the most fundamental skills of successful facilitators is their ability to quickly learn enough about new domains and applications to then be able to draw parallels with their existing knowledge and help to solve the problem at hand. There is usually not enough time to enroll in a traditional training course or attend a seminar when a new domain or application is encountered.

The Cyberteam Portal is used to access self-service learning resources that provide just in time information delivery to participants as they embark on projects in unfamiliar domains. The goal of these learning resources is to reduce the need for direct assistance; reduce duplication of effort by adapting and building awareness of available documentation, training, application software and software utilities; and supplement these resources where there are high impact opportunities. Using a common tagging infrastructure and voting capabilities modeled after crowd-sourced repositories such as Stack Exchange, we are building a uniform underlying structure. This allows a user to click on a tag from any part of the portal and obtain a listing of all content, including mentor profiles, project profiles, frequently asked questions, and training resources.

The self-service learning section of the Portal is designed to accommodate three types of information commonly needed by RCFs: 1) Frequently asked questions whose answers evolve over time as technology advances, serviced by Ask.CI, a Q&A Platform for Research Computing [5]; 2) Relatively static information such as introductory training modules on linux clusters, programming languages and schedulers, serviced by a Training Resources Wiki; and 3) Dynamic, situation specific information needed to solve an immediate problem, typically handled by a Help Desk at larger institutions, serviced by a Regional Help Desk.

The Northeast Cyberteam program also relies heavily on the Cyberteam Portal for management of project workflows, recruitment of mentors and student facilitators, and recording results. Any individual interested in working on a project as a researcher, mentor or student facilitator can create an account and become part of the community. The management section of the portal captures experiences, lessons learned and impacts on a per project basis which have subsequently been used in publications and reporting.

The Portal provides mentor matching and targeted learning resource identification utilizing the underlying tagging mechanism. Recognizing that: 1) these functions benefit from broader participation and 2) many Portal functions have utility beyond the Northeast Cyberteam, the Portal was developed with an eye toward making it possible for other communities to adopt it without incurring significant cost, while maintaining their own branding and project workflows.

III. State of the Practice

The Northeast Cyberteam Program allows researchers at small and mid-sized institutions to take advantage of cyberinfrastructure when their work requires it. Simultaneously, it exposes a new generation of potential facilitators to this exciting and dynamic field earlier in their careers, significantly expanding the available pool of candidates. Our sustainability explorations have yielded opportunities to collaborate with other groups focused on workforce development for the research computing community and we continue to seek additional partners. Collaboration is facilitated through the use of the Cyberteam Portal. In a pilot launched in July 2020, the CAREERS, Great Plains Network, RMACC, SWEETER, Kentucky, TRECIS Cyberteams; and Colorado School of Mines have been exploring use of the Portal as a management tool for their related programs. CAREERS also adopted the Northeast Cyberteam model as a key component of its strategy for workforce development. Preliminary results, and future plans will be presented.

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