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Project Summary: **Sustainable Funding and Business Models for Academic Cyberinfrastructure (CI) Facilities Workshop II**

Today's academic research institutions face two difficult and opposing challenges. The first is the growing need for infrastructure required to perform competitive research including but not limited to: computational and data analysis resources; new, more sensitive and accurate instrumentation; and an ever-increasing array of geographically distributed sensors. While funding agencies such as the National Science Foundation, Department of Energy, and the National Institutes of Health provide access to a tremendous set of national resources, there is still a great demand by researchers for access to infrastructure resources at their home institutions. For this reason the NSF-funded Extreme Science and Engineering Discovery Environment (XSEDE) project is actively working to find ways to facilitate the bridging of campus resources to national cyberinfrastructure. The second and opposing challenge is a reduction in infrastructure budgets at academic research institutions due to rising costs and growing competition for limited research funding. At the intersection of these two challenges is sustainability, requiring careful strategic investments balanced with measurable returns, increasingly expressed in dollars. This dilemma--the growing need for research cyberinfrastructure coupled with rising costs and decreasing funding sources--is a concern at all levels: institutional, state, regional, and national. This workshop will bring together researchers, research service providers, academic leaders with strategic decision-making authority, funding agencies, and industry in an open forum to discuss the challenges, opportunities, and both time-tested and emerging strategies for developing and maintaining sustainable funding and business models for academic cyberinfrastructure (CI) facilities.

Intellectual Merit: Identifying and implementing sustainable funding and business models for supporting cyberinfrastructure is central to our nation's competitiveness. In this information age with increasing demands for a highly technical workforce it is imperative that our academic institutions properly prepare the workforce of tomorrow. Doing so requires a clear understanding of the infrastructure requirements, technical skills, and strategies used by scientists and engineers to address our nation's most difficult research problems. Understanding the benefits and limitations of current approaches to these difficult problems, as well as how disruptive technologies such as cloud computing may play a supporting role, is an essential part of strategic CI planning.

Broader Impacts: Those attending the workshop--including academic researchers, infrastructure service providers, and administrative leadership, along with representatives from federal funding agencies--will discuss current research challenges and infrastructure costs, and develop and share strategies to address them. These discussions and presentations will be recorded and made available via the workshop web site so that other institutions can learn from them on-demand, and identify strategies that may work for them. The desired result is to help increase the sustainability, and the number, of academic cyberinfrastructure facilities in the U.S., including those in economically disadvantaged areas of the country.

Project Description

In May, 2010, the National Science Foundation sponsored the first "Sustainable Funding and Business Models for Academic Cyberinfrastructure (CI) Facilities" workshop. A distinguished group of 119 cyberinfrastructure facility directors, HPC center directors, research VPs, and CIOs participated in the workshop held at Cornell University. The workshop presentations and 28 contributed position papers are still referenced regularly today at http://www.cac.cornell.edu/srcc. The landscape was changing in 2010 and participants at that workshop noted that advanced computing infrastructure and services had become commonplace requirements for researchers, not a differentiating resource or facility. Funding opportunities for campus computing infrastructure were limited and the competition for them was growing tougher. These trends continue today. With ever-shrinking budgets and new disruptive technologies such as cloud computing, the search for improved sustainable funding and business models by academic institutions is urgent. The Coalition for Academic Scientific Computation, with support from the National Science Foundation, proposes to host a 2nd workshop October 2-3, 2013 at the Westin Arlington Gateway, in Arlington, VA. This workshop will bring together leaders on this subject from academia, industry and funding agencies to share and contrast various challenges, opportunities and solutions that have evolved over the past few years.

Workshop Objective and Goals

The objective of this workshop is to provide an open forum for discussion, sharing and debate among the workshop participants and representatives in various positions responsible for the funding, deployment, use, and maintenance of advanced cyberinfrastructure resources. One goal is to achieve a clear understanding of individual and organizational challenges, requirements, solutions, and funding models. These are sensitive topics for institutions which often relate strategic goals with securing a competitive edge. Unlike other workshops, where these sorts of details are commonly discussed by individual participants during breaks or at informal evening settings, each session of the workshop will provide a set of short and provocative panel presentations that inspire active participation by the attendees. Another goal of this workshop is to identify promising strategies and solutions and to capture them digitally so that they can be shared broadly via the web. The greater research community can then adopt and adapt lessons learned to their specific CI requirements.

Recent Related Meetings and Talks

2013: NSF- and CASC-sponsored workshop at Westin Arlington Gateway, Arlington, VA – "Research Data Management Implementations Workshop"
http://rdmi.uchicago.edu/

2011: NSF-sponsored workshop at Princeton University, Princeton, NJ – "Research Data Lifecycle Management"
http://rcs.columbia.edu/rdlm

2010: NSF-sponsored workshop at Cornell University, Ithaca, NY – "Sustainable Funding and Business Models for Academic Cyberinfrastructure (CI) Facilities" (Workshop I)
http://www.cac.cornell.edu/srcc/

2009: Presentation at CASC Meeting of review of workshop recommendations from 2008 CASC/EDUCAUSE report - "Developing a Coherent Cyberinfrastructure from the Campus to the

National Facilities: Challenges and Strategies" from joint workshop by the EDUCAUSE Net@Edu campus Cyberinfrastructure Working Group (CCI) and CASC
http://casc.org/papers/EPO0906.pdf

2007: A report published by EDUCAUSE focused on Business Models for Sustainable Data Centers http://www.educause.edu/Resources/BusinessModelsforSustainableDa/160195
Educause Net@EDU (State Networks)
Guy T. Almes (Texas A&M University)
Paul Killey (University of Michigan-Ann Arbor)
James Pepin (Clemson University)
Dallas Thornton (University of California, San Diego)

2006: Presentation at the University of Oklahoma Supercomputing Center for Education & Research Symposium on Sustainable Funding Models for Academic High Performance and Research Computing was given by Dan Stanzione - Director ASU.

Organizing Committee

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CASC Executive Committee – Workshop Organizing Committee

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Proposed Location, Date and Announcement

The event is planned for October 2nd and 3rd at the Westin Arlington Gateway in Arlington, Virginia: http://www.westinarlingtongateway.com/

Announcement of the workshop will be via CASC, XSEDE, and EDUCAUSE ACTI mailing lists as well as a news release on HPCwire and Supercomputing Online. A conference web site will provide conference details and logistics for potential participants.

Meeting Organization, Agenda, and Dissemination of Results

Drawing upon the experiences of the organizing committee at other related workshops, we will focus on topics and issues of most concern to the attendees and the greater research community. Active participation and discussion by the attendees and the presenters will serve as the best mechanism to encourage participants to share answers to challenges such as funding and budgeting, recruiting and retention of high quality staff, integrating new technologies, and maximizing the effective use of the national CI portfolio. In previous related workshops many of these discussions took place in breakout sessions or in the hallway during breaks. In this workshop we will make every effort to have those types of discussions during the main meeting sessions so that all may benefit and so that they may be accessed in the future at the conference web site. We propose to have an open discussion-based format for this workshop with seven panels focused on the following issues:

1. Administrative perspectives provided by institution leadership on the value and funding of CI
2. Institutional models, challenges, and opportunities for academic CI facilities
3. Changing research and education drivers and their infrastructure requirements
4. Role of state funding agencies in CI and regional CI projects and trends
5. Workforce development programs, issues, and challenges
6. Role of federal funding agencies in CI, today and tomorrow
7. Planning for the future of CI – trends, challenges, opportunities, and solutions

Each panel will have representatives from the diverse types and sizes of organizations that are actively engaged in research cyberinfrastructure. Each panelist will be given 10 minutes to present trends, challenges, and/or opportunities that they are facing. The rest of the session will be a moderated discussion driven by audience participation. Our goal is for these short and pointed panelist presentations to be engaging if not provocative. Feedback from the workshop attendees will be a valuable component of the workshop. Rather than produce a technical report after the workshop, we propose to host a workshop web site that provides videos of all panel presentations and associated discussions that are indexed so that others will be able to quickly find what they are looking for. All panelist presentations will also be available for easy download. Based on experience from the previous sustainability workshop held at Cornell University (www.cac.cornell.edu/srcc), the community will continue to use the workshop web site as a reference for sustainable strategies and solutions for providing campus cyberinfrastructure--including but not limited to advanced computing infrastructure--for years after the workshop.

Focus of Panel Discussions

CASC Treasurer Philip Smith will lead a CASC membership ad hoc committee to create a list of the top 10-15 questions that the community would like to discuss during each panel. The organizing committee will then share these questions with the panelists to help them frame their short presentations. What follows are the intended foci for each panel, the intended backgrounds of the panelists, and some initial questions the CASC executive committee created to help guide the committee.

Panel Discussion 1: Administrative perspectives from academic institution leadership
Panelists include administrators at the provost/chancellor, vice provost/chancellor, CIO, or dean level
Topics include:

- Strategic value of advanced computing and data analysis from an institutional perspective
- Sustainability concerns for large resource grants
- Administrative costs for supporting research – financial, reporting, and compliance
- How disruptive technologies such as cloud may be/are already being leveraged

Panel Discussion 2: Institutional models, challenges, and opportunities
Panelists include leadership of advanced cyberinfrastructure facilities
Topics include:

- Cost recovery models
- Strategies for leveraging new, often disruptive, technologies
- Importance of participating in national cyberinfrastructure
- Workforce concerns – staffing challenges at all levels and diversity

Panel Discussion 3: Changing research and education drivers and their infrastructure requirements
Panelists include faculty and researchers whose research and teaching methodologies are putting increasing demands on computing infrastructure.
Topics include:

- What infrastructure resources are you in greatest need of?
- Is your research or teaching constrained by the lack of resources?
- How do you see changes in the way you are doing research or education impacting your research infrastructure requirements over the next five years?
- Who provides these resources to you today and how are they paid for?

Panel Discussion 4: Role of state funding agencies and regional efforts
Panelists include leadership from state and regional funding agencies who fund or oversee cyberinfrastructure activities and resources
Topics include:

- Important challenges and funding priorities, current and in the next five years
- Discussion of state and regional models that are working
- Do state and regional initiatives/objectives align well with national initiatives/objectives?
- Examples and value propositions of state and regional efforts participating in national cyberinfrastructure initiatives

Panel Discussion 5: Workforce development programs, issues, challenges
Panelists include leadership from industry, academia and federal agencies who are focused on workforce development strategies, issues, and challenges.

Topics include:

- Education in the information age, attracting students to science and engineering fields
- Technical workforce requirements – skills and qualities of competitive applicants
- Importance to national competitiveness

Panel Discussion 6: Role of federal funding agencies
Panelists include leadership federal funding agencies that fund or oversee cyberinfrastructure activities and resources

Topics include:

- Important challenges and funding priorities, current and in the next five years
- Discussion of national models that are working
- Sustainability issues on proposal requirements – data management plans, broadening participation and others
- What can the community do to help support the mission of the funding agencies – goals, metrics, communications, other?

Panel Discussion 7: Planning for the future – trends, challenges, opportunities, and solutions
Panelists include thought leaders from academia, government, and industry
Topics include:

- Future of HPC and research computing – from petascale to exascale, big data to cloud, simulation to sensor data
- How do we continue to meet researcher needs in the era of big data and increasingly sophisticated computational models?
- What roles will cyberinfrastructure resources (computing, big data, and instrumentation) need to play in emerging and future research?

***Early Preliminary Version* of Proposed Workshop Agenda**

Wednesday, October 2

7:30 am	**Registration**	Ballroom D
7:30 - 8:30	*Continental Breakfast*	*Foyer Ballroom D*
8:30 - 9:00	Welcome - Dr. Farnam Jahanian, NSF CISE AD	
9:00 - 9:45	Keynote - "Sustainability" – a perspective	
9:45 - 11:00	**Panel Discussion 1**: Administrative perspectives from academic institution leadership President Michael McRobbie – Indiana Univ (invited) Dr. Juan Sanchez,VP for Research, UT at Austin Dr. Robert Buhrman, Sr. VProvost for Research, Cornell	
11:00 - 11:15	*Break*	
11:15 - 12:30 pm	**Panel Discussion 2**: Institutional models, challenge, and opportunities Dr. Eric Michielssen, Assoc VP, U Mich (invited) Dr. Susan Atlas, Director CARC , UNM Dr. Jim Davis, Vice Provost, OIT, UCLA (invited)	
12:15 - 1:15	*Lunch*	
1:15 - 2:15	**Panel Discussion 3**: Changing research and education drivers and their infrastructure requirements Dr. Shaoen Wang, U of Illinois, NCSA Dr. Patrick Reed, Cornell	
2:15 - 2:45	*Break*	
2:45 - 4:30	**Panel Discussion 4**: Role of state funding agencies and regional efforts Dr. Azer Bestavros, Director, Hiriri Inst for Computing (invited) Dr. Steven Koonin, Director, Center for Urban Science & Progress (invited)	
4:30 - 4:45	Recap and plan for tomorrow	
5:30 6:00 - 9:00	Buses Board in Front of Hotel for Dinner Cruise Dinner Cruise aboard Spirit of Washington	

Thursday, October 3

7:30 - 8:30 am	*Breakfast*	*Foyer Ballroom D*
8:30 - 9:30	**Panel Discussion 5**: Workforce development programs, issues, challenges Dr. Robert Atkinson, President ITIF Dr. Pankaj Shah, Director OSC Dr. Cynthia McIntyre, Council on Competitiveness (invited)	
9:30 - 10:45	**Panel Discussion 6**: Role of federal funding agencies Dr. Patricia Dehmer, Deputy Dir. DOE, OS (invited) Dr. Charles Romine, Dir. NIST Info Tech Labs (invited) Dr. John West, Dir, DOD MoD program (invited)	
10:45 - 11:00	*Break*	
11:00 - 12:30 pm	**Panel Discussion 7**: Planning for the future – trends, challenges, opportunities and solutions Dr. Werner Vogels, VP & CTO, Amazon (invited) Dr. Tony Hey, VP, Microsoft (invited) John Towns, PI, XSEDE project, NCSA CRAY (invited)	
12:30 - 1:30	*Lunch*	

Recruitment of Participants

David Lifka is the current Chair and Curt Hillegas is the current Vice Chair of the Coalition for Academic Scientific Computation (CASC), an organization consisting of representatives from most of the academic high performance computing centers in the US, totaling 70 member institutions. The CASC executive committee will actively recruit participation from CASC member institutions as well as the XSEDE and EDUCAUSE ACTI communities.

Data Management Plan

Each presentation and panel discussion will be videotaped and made available to the public on the workshop website (http://www.casc.org/SRCCII) along with any presentation materials that are shared at the workshop with written consent of the speaker. The videos will be indexed in such a way that users will be able to quickly find any presenter or topic that they are interested in. Based on experiences of the members of the organization committee who were actively involved in the 2010 NSF-sponsored workshop at Cornell University--"Sustainable Funding and Business Models for Academic Cyberinfrastructure (CI) Facilities"--we expect the workshop materials on the workshop web site to be relevant for five years after the workshop is completed. Support for web hosting and data storage are requested at the Cornell University Center for Advanced

Computing for five years after the workshop ends in order to maximum distribution of the lessons learned from the workshop.