

Key Outcomes Memorandum

Date: October 6, 2009

To: Jim Rice, Executive Director, South Dakota EPSCoR Project

From: Scott McCreary and Rebecca Tuden, CONCUR, Inc.

Re: Key Outcomes Memorandum – September 24, 2009 Cyber-enabling Research, Education and Economic Development Meeting

I. Executive Summary

On September 24, 2009, the South Dakota Experimental Program to Stimulate Competitive Research (EPSCoR) Project convened a meeting entitled, *Cyber-enabling Research, Education and Economic Development* in Rapid City, South Dakota. The meeting focused on three primary objectives:

- Provide updates on the status of NSF-funded cyberinfrastructure
- Foster a better understanding of the cyberinfrastructure linkages between schools, colleges, the private sector, economic development and the state;
- Identify opportunities to strengthen the region's cyberinfrastructure.

Meeting participants included more than 150 individuals from a broad range of educational, governmental, and research institutions and the private sector. Several colleagues from Wyoming participated in the meeting and held a breakout session. The plenary meetings and South Dakota breakout sessions were facilitated by Scott McCreary and Rebecca Tuden from CONCUR, Inc., with Mike Adelaine of South Dakota State University (SDSU) moderating one of the South Dakota breakout sessions. The meeting was preceded by a research poster session on the evening of September 23, 2009.

Key outcomes from the meeting were as follows:

Presentations on the status of key cyberinfrastructure in both Wyoming and South Dakota.

Presenters gave updates on the following topics: Northern Tier Network activities on updating the cyberinfrastructure, including the Research Education and Economic Development (REED) project; Wyoming's National Center for Atmospheric Research new supercomputing facility; and the partnership to improve the service nodes of the South Dakota Networks (SDN).

Presentations on South Dakota's educational programs and work force development activities that support cyberinfrastructure.

These presenters focused their discussion on the human components necessary to create a successful cyberinfrastructure. Information included a description of the efforts underway to make South Dakota's high school curriculum more relevant to cyber-related jobs and education; description of the types of computational science and

engineering research and education programs being developed in the universities and colleges around the state and their constraints; and a discussion of the types of work force skills needed by the private sector.

Sector-focused breakout sessions. Discussed key concepts and strategies for a South Dakota EPSCoR draft action plan in each of three identified sectors: *Infrastructure Development/Connectivity; Computational Science & Engineering Research & Education Program Development; Work Force Development.* Discussions in each sector focused on the following three questions:

- *Where do we want to be in 5 years? 10 years?*
- *What steps do we need to take to achieve this?*
- *How could partnerships between and among the sectors support these efforts?*

The themes from these three topic areas – each engaged in separate breakout sessions – are summarized below and will be used to expand the South Dakota EPSCoR project’s cyber infrastructure plan.

Key next steps based on the meeting discussions are outlined in Section III below.

II. Key Outcomes

A. Welcome & Opening Remarks

The meeting began with welcoming remarks from several individuals.

David Link, Director of Research at Sanford Laboratories, provided a general welcome to meeting participants, emphasizing in particular the welcome growth of cyberinfrastructure technology in South Dakota.

Randy Lewis, Director of the Wyoming EPSCoR project, highlighted the potential and importance of interstate collaboration between Wyoming and South Dakota on cyberinfrastructure.

Gary Johnson, South Dakota Board of Regents, gave a presentation explaining the Regents’ goal of stimulating and building research capacity in South Dakota. He highlighted the current proposals and funding that support the State’s research centers and the job creation and revenue generated from this research.

Jim Rice, Executive Director of the South Dakota EPSCoR Project, welcomed participants and emphasized the importance of this meeting to support the strategic plan for South Dakota’s National Science Foundation EPSCoR grant.

CONCUR facilitators Scott McCreary and Rebecca Tuden underscored the three primary objectives for the day: (1) provide updates on the status of NSF-funded cyberinfrastructure; (2)

foster a better understanding of the cyberinfrastructure linkages between schools, colleges, the private sector, economic development and the state; and (3) identify opportunities to strengthen the region's cyberinfrastructure. They also emphasized the complementary structure of the morning presentations and afternoon breakout sessions.

B. Presentations on Status of Cyberinfrastructure

Claude Garelik of the South Dakota Board of Regents gave a status report on the cyber improvements in the Northern Tier as part of the REED project. This project has provided cyberinfrastructure and networking access to the universities and research entities across the state. He also discussed the future stages in the capacity upgrades including investments in Internet 2 and High Performance Computing (HPC). He stressed that the intent of these upgrades is to connect the South Dakota universities and research entities to other institutions around the country and should help improve coordination and data-sharing.

Bill Gern from the University of Wyoming provided an update of NCAR's supercomputing facility under construction in Cheyenne, Wyoming. The focus of the research is on climate and atmospheric sciences with an emphasis on computational modeling in coal and gas fluid and carbon sequestration.

Vernon Brown of SDN Communications explained the upgrades being done on the service nodes across the state. He discussed the entities responsible for the maintenance and operation of these nodes. This effort supports improving the connectivity to other states and the REED network upgrades.

C. Presentations on Status of Educational Workforce support for Cyberinfrastructure

Three presenters focused on the essential role of different sectors to support cyberinfrastructure and their ongoing efforts to build upon the cyberinfrastructure capacity.

Kurt Cogswell of SDSU provided a perspective on the work of research institutions and computational science and engineering graduate education programs and how their work relies upon cyberinfrastructure. He commented that many of the 2010 Research Centers were benefiting greatly from the past investments in cyberinfrastructure and that additional support was needed in intercampus data sharing. He also highlighted the faculty and university needs for growing a Ph.D. program and the need for more people to assist with support of the cyberinfrastructure including data administrators, administrative and faculty support for research programs and students from within South Dakota.

Mark Wilson of the South Dakota Department of Education provided an overview of the state's effort to develop and promote a curriculum that can support a growing cyberinfrastructure economy. The State is using career cluster coursework to help students identify the coursework for different career paths and job opportunities. They are also working with different employers to help provide students with on-the-job exposure to and training for different job opportunities.

Joe Krizan from Omnitech provided the perspective of a high tech company and its work force needs. He emphasized that combining a knowledge of technology along with a knowledge of basic business models should be a goal for all information technology students. He also suggested that increased collaboration with the universities and their research focus could help develop additional high tech businesses and opportunities in the state.

D. Summary of Break-Out Sessions

Below is a summary of the primary themes generated in each of the three breakout sessions: 1) *Infrastructure Development/Connectivity*; 2) *Computational Science & Engineering Research & Education Program Development* and; 3) *Work Force Development*. These summaries represent the range of comments shared by participants at the sessions, but are not intended to reflect consensus views. The work groups did not discuss assigning a rank order for these ideas and the numbering below is not intended to reflect any priority setting.

Infrastructure Development/Connectivity - Status, Goals and Needs

Discussions in the breakout session on *Infrastructure Development/Connectivity* centered on concepts to strengthen the state's current cyberinfrastructure. Below is a listing of the primary goals and potential steps generated by the discussions.

- 1. Provide specific improvements to further support existing cyberinfrastructure**
 - Recognize the importance of providing beyond T1 connections to private colleges, tribal colleges, rural South Dakota, and others at affordable rates.
 - Address storage needs, disaster recovery and backup plans.
- 2. Increase the availability of cyberinfrastructure for specific activities**
 - Provide widespread availability of high definition, high quality video conferencing throughout the state.
 - Establish small community broadband for medical clinics in the rural communities to enable "telemedicine".
 - Increase access for tribal colleges to IT personnel.
- 3. Enhance the availability and skills of IT work force**
 - Grow the pool of well-qualified applications to enhance the educational experience.
 - Strengthen personnel and workforce development: expand resources for HPC and computation science, and parallel programming personnel.
- 4. Take steps to market South Dakota's business attributes**
 - Convey the positive business message about South Dakota. Share success stories.
 - Explain South Dakota strengths and explain what technical terms mean in relation to South Dakota attributes.
 - Convene meetings with economic development and chamber representatives to communicate the importance and value of technology.

Computational Science & Engineering Research & Education Program Development – Status, Goals and Needs

The breakout session on *Computational Science & Engineering Research & Education Program Development* centered on outlining goals, discussing a handful of steps for moving forward and identifying the benefits of collaborative approaches. This workgroup stressed the importance of taking action on these issues as quickly as possible (i.e. now). As already noted, the session summary reflects ideas discussed and is not intended to represent a consensus viewpoint nor have these ideas been ranked in any order of priority.

Below is a listing of the primary goals generated by breakout session participants:

- 1. Clarify status of different components supporting South Dakota’s cyber-infrastructure**
 - Clarify and distinguish computational science, engineering research, and educational development.
 - Clarify to what end South Dakota is building cyberinfrastructure.
 - Define driving problems in computational science that “test the system”; with emphasis on overcoming isolation and building a platform for the future.

- 2. Recognize and support important components of South Dakota’s cyberinfrastructure**
 - Explicitly recognize the interdisciplinary nature of computational science.
 - Recognize that computational science is the “math of the 21st century”.
 - Recognize the central role of teachers and faculty in these efforts. Give them a repertoire that includes familiarity with computational techniques.
 - Recognize that budding businesses are relying on this cyberinfrastructure.

Breakout session participants also identified several specific steps that would help the state achieve meaningful goals in this area:

- 1. Support and promote university efforts related to cyberinfrastructure**
 - Develop the computational skills of teachers and professors and improve computational literacy across disciplines. Options include convening regional workshops in South Dakota; bring in experts to assist building homegrown capacity and fund South Dakota instructors to attend national workshops.
 - Identify a leader at each institution to support individual faculty with their respective initiatives.
 - Recognize that some grants require research institutions to post or share data as a condition of funding. Create protocols to address proprietary private business procedures or processes to address the concerns of private sector participants in collaborative efforts.
 - Build on strengths of individual institutions. Encourage collaboration to co-draft curricula on computational thinking.
 - Look for ways to retain students until graduation at tribal colleges to obtain full skill set.
 - Once curricula are developed, share common core courses.

- Identify needs for human capital to help establish funding priorities for educational faculty.

2. Build partnerships and use collaboration to help promote more opportunities for economic development

- Include Wyoming counterparts in both the organization and participation in workshops.
- Create opportunities for students to shadow professionals in business and identify coordinator for program.
- Create partnerships between educational institutions and business that emphasize telecommuting opportunities.

Workforce Development - Status, Goals and Needs

The third breakout session – *Workforce Development* – identified an overarching goal of creating a vibrant economic workforce in the next five to 10 years. They also recommended several steps to achieving that goal including that formation of more partnerships and communication across the sectors and to the public were necessary steps to help achieve their goal. The session summary reflects ideas discussed and is not intended to represent a consensus viewpoint nor have these ideas been ranked in any order of priority. Below is a summary of the deliberations.

1. Create a vibrant economic workforce

- Retain students in the state post-graduation from universities.
- Attract students and workers from out of state.
- Create industries that have the capacity to employ people.
- Create an education system that can respond to the needs of industry.
- Analyze existing skills sets of South Dakota workforce.

2. Promote and build partnerships between educational institutions, government and employers

- Establish more cross training opportunities in education/university curriculum in order to create an employable work force.
- Create internships/job shadow programs.
- Communicate programs such as South Dakota SEED (business and government)
- Convene community roundtables (government and university).
- Improve communication including develop strategies to communicate among all stakeholders and to advertise existing opportunities to outside business.

3. Improve Economic Development

- Create technology corridors.
- Advertise existing opportunities to outside business.

III. Intended Next Steps

Jim Rice indicated that all presentations from this meeting are available on the EPSCoR website at www.sdepscor.org.

The synthesis of key outcomes from the breakout sessions will be made available for a one week public comment period in early October. A link to the site will be emailed to all meeting attendees and then to the EPSCoR listserv before transmittal to the EPSCoR Advisory Committee.

Once these comments are synthesized, they will be folded into a preliminary action plan for EPSCoR's cyberinfrastructure strategic development plan. As indicated in the preliminary action plan, meeting attendees are encouraged to provide comments and suggestions on this preliminary plan by late October.

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