iUtah EPSCoR Track 1 - External Advisory Board Report

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Strengths

Research and CI:

1) Major facility development. iUtah has made significant progress with respect to design, acquisition and installation of the instrumentation associated with the project's major facilities such as GAMUT and the analytical facilities. Other major facility planning and development appears to be on track. The project leadership and Jim Ehleringer are commended for having achieved most objectives on or ahead of schedule.

2) Information Technology Development. iUtah has done a good job in developing digital storage and sensor networking. The computer networks and digital storage are well developed and appear capable of meeting immediate and future needs of all the partners. Sharing of data is a critical resource for a project of this scope.

3) Building Research Strength. The team has been successful in building collaborations to address new research opportunities. Planning for future grant opportunities appears to be incorporated into meeting protocols and agendas, and has resulted in several grant submissions for research that builds on the iUtah project.

Workforce development, Education, and Diversity:

4) Summer Institute. The Summer Institute is outstanding, and has exposed students at various educational levels to hands-on science and collaborative research on difficult but important research questions. It is good to highlight this for the whole EPSCoR community, as was done at the All Hands meeting.

5) Graduate student engagement. iUtah offered one-year appointments to Utah graduate students in order to kick-start project research efforts. These one-year appointments appeared to be especially effective in achieving the desired outcomes and the External Advisory Committee was extremely impressed with the quality of the work done to date as illustrated in the highly professional poster presentations.

6) Engaging broad audiences. The iUtah team has thought creatively about how to enhance the STEM workforce by developing programs for a diverse range of learners that inspire students to choose STEM careers. One of the more notable activities was an attempt to encourage participation in STEM through an appearance by Miss America. The team is urged

to continue seeking creative ways to strengthen and diversify the Utah STEM workforce, an endeavor which poses large challenges.

Project communication, coordination, assessment, and sustainability:

7) Partnerships. The iUtah group has done a great job of developing partnerships with several Utah universities and other institutions. The partners seem to be active and well connected to the project. The partners are actively communicating and sharing resources to work toward project success.

8) Inclusiveness. The Annual Meeting clearly demonstrated the inclusiveness of Utah EPSCoR and showed integration across institutions. The attendees included undergraduates, graduate students, postdocs, faculty from several levels of career development, and many staff. The attendees interacted across campuses and institutions and networked very actively.

9) State Infrastructure. The iUtah and Utah EPSCoR teams are to be congratulated for successfully implementing their Track 1 project at the same time as they have been building the state infrastructure for the EPSCoR program. The iUtah team has obtained additional state support for several aspects of their project, which speaks to their very effective engagement with stakeholders throughout Utah.

Opportunities for Additional Engagement and Project Coordination

Research and CI:

1) A unified study basin. The three focal study basins are clearly thought of as representing three different projects or sub-projects, neatly organized by leadership and lead institution. Yet in order to maximize the value of the research, the teams need to be thinking of themselves as all part of one larger project, and begin to stress their unity, rather than their individuality. Because all three basins are in fact part of the same larger drainage basin (the Great Salt Lake drainage), why not start thinking of them that way?

2) Scale in biophysical and social research. There appears to be a mismatch between the scale at which biophysical investigations occur (some stream sampling sites along a long drainage network) and the scale at which socioeconomic studies occur (analysis of behavior and water use down to census block and individual parcel). How will the two be integrated? Will social science data be aggregated, or will additional biophysical studies be conducted at fine scale? There seem to be opportunities/difficulties that may not be fully appreciated until scaling issues are addressed.

3) Field work for multiple RFAs. The project will enhance efficiency and the likelihood of success if there is more clarity in the goals of the field work components of research focal areas 1 and 3. RFA 3 includes field work that seems to be similar to the work in RFA1, yet it was not clear how the two efforts would be integrated, or leveraged.

4) Data management implementation. The CI team has made outstanding progress in developing the project's data storage system and the GAMUT sensor networking CI. Significant attention is being paid to creating user-friendly solutions and the team has implemented a very successful hydroinformatics course for iUtah and other students. The External Advisory Board commends these efforts, but also recommends that additional actions be taken to insure that data sharing, data and metadata management tasks, and integration and synthesis activities proceed on schedule. In particular, we believe that it would be very beneficial to design and routinely (e.g., annually) offer a short course for iUtah faculty and students (possibly 4-6 hours) that addresses key data and related needs and technological solutions (e.g., use of relevant iUtah data acquisition tools such as those designed for GAMUT, use of the DMP Tool for design of data management plans, metadata requirements and approaches/tools for entering and managing metadata, data preservation processes, Hydrodesktop, etc.). Design of such a course would ideally be based on significant faculty and student input so that the appropriate level of technical expertise and needs are addressed; many short courses assume that faculty and students are more technically skilled than they actually are and, consequently, do not meet learning objectives. An additional approach that may greatly enable adoption and effective use of appropriate tools and approaches would be to identify one or more Data Management Campus Champions that would be associated with each Utah center of higher education and who would assist students and faculty directly or indirectly (e.g. pointing people to those with the appropriate expertise).

Workforce development, education and diversity:

5) K-12 Education. The Advisory Board would appreciate hearing more about plans for engaging K-12 students and undergraduate students. There are opportunities to leverage other programs such as the Utah Society for Environmental Education (USEE) and Utah State University Water Quality Extension, both of which use the Project WET curriculum materials to engage K-12 audiences. The project may want to consider a partnership with Project WET to develop specific K-12 materials for Utah (Arizona developed a couple of references providing specific resources on Arizona, which are now distributed through the Project WET online store). Efforts in K-12 education can also enhance public outreach by using K-12 schools and students to reach families of the K-12 students. The Institute for Tribal Environmental Professionals (ITEP) also has certified Project WET trainers that could assist with teacher workshops in Utah.

6) Underserved Populations. The Advisory Team would also appreciate hearing about plans for increasing outreach to underserved populations within Utah. The Institute for Tribal Environmental Professionals (ITEP) at Northern Arizona University has an outreach program that could partner with iUtah to expand relationships with tribal organizations in the region and Native American students throughout the state. The Office for Equity and Diversity at the University of Utah may be helpful for addressing the needs of other underserved ethnic groups.

7) Engagement. Engagement activities are more likely to be successful if there is better clarity between those which are for specific stakeholders, and those which are for the general public. External engagement in the iUTAH generation of NSF EPSCoR has a slightly different definition of external engagement than previous RFPs. After clarifying with the attending Program Officer, it seems that engagement of both the lay public and stakeholders are meant to be included in external engagement. It would be helpful if in future presentations it were more clear how much effort was going into each kind of engagement.

Project communication, coordination, assessment and sustainability:

8) Sustainability. Planning for the sustainability of future research and education efforts that build on iUtah's strong foundation will be critical to achieve long-term impacts. In future meetings it will be helpful to hear more about how the research, engagement and other plans will be sustained into the future. NSF considers pilot or seed awards to be part of this process and these might be highlighted next time.

9) Assessment. The nature of assessment processes should be made clearer to all iUtah participants. The assessment process was not discussed very directly in the presentations, and the work with undergraduate students and programs for other levels of students through museums, for example, will need assessment processes that probably are in place but were not discussed.

10) Subsequent meeting agendas. The External Advisory Committee felt that the iUtah project meeting was reasonably effective at informing project participants about progress to date and at highlighting work done by students over the past year. However, the External Advisory Board suggests that future meetings be much more interactive and engaging. In particular, project meetings represent a unique opportunity to address challenges associated with integrating activities within and, more importantly, across the domains represented (natural sciences, engineering, social sciences, and education). In order to accommodate and promote greater interactivity, meetings could be designed so that there is a single hour-long plenary (i.e. project updates for all major activities including education, diversity, and progress in meeting project performance metrics) first thing in the morning, followed by a 2 +- hour long session focused, for example, on challenges and approaches to integrating data within the individual research focus areas, coordination within the workforce development, education and diversity areas, etc. Lunch might include a 30-minute inspirational talk highlighting particular successes related to science, education, or diversity-enhancement. Afternoon interactive sessions could then focus on addressing cross-domain challenges and solutions such as how to use/translate GAMUT results into effective learning modules. Ideally, such interactive sessions would be conducted in small enough breakout sessions that all participants would be able to contribute. [Note: it may be useful for iUtah leaders to be trained in successful meeting facilitation approaches so that the sessions truly engage project participants.] Lightning talks (1 minute timed presentations based on 1 slide per person) could be used after the afternoon break as a mechanism to highlight student and faculty posters that could be viewed as part of a late afternoon social. A final short plenary talk could be given by project leaders to highlight next action steps and calendar items.

The agenda for project meetings would be expected to evolve over time to meet project needs and may never reflect what is proposed above as an example. The Committee is not as concerned about the agenda content as it is about having future meetings being optimally effective and engaging for all project participants.