

## **NSF CI-TEAM AWARD 0537498: MINORITY SERVING INSTITUTIONS CYBERINFRASTRUCTURE INSTITUTE (MSI-CII)**

<http://www.educationgrid.org>

Geoffrey Fox, Indiana University, [gcf@indiana.edu](mailto:gcf@indiana.edu); Richard A. Alo, University of Houston Downtown, Center for Computational Science, [www.uhd.edu/ccsds](http://www.uhd.edu/ccsds), [ralo@uh.edu](mailto:ralo@uh.edu); Karl Barnes, NAFEO, [www.nafeo.org](http://www.nafeo.org) [karl.barnes@gmail.com](mailto:karl.barnes@gmail.com); Diane Baxter, SDSC, [dbaxter@sdsc.edu](mailto:dbaxter@sdsc.edu); Julie Foertsch [foertsch@wisc.edu](mailto:foertsch@wisc.edu); Al Kuslikis, AIHEC, [AKuslikis@aihec.org](mailto:AKuslikis@aihec.org); or Alex Ramirez, H AC U, [aramirez@hacu.net](mailto:aramirez@hacu.net)

Updated January 11 2008

### **Findings**

The project findings were derived from the MSI CI institute activities, planning meetings, the weekly phone calls and the formal reviews carried out by Julie Foertsch after our two major meetings in January and June 2006 at SDSC. These are put as appendices I and II of this document.

#### **General Findings**

- 1) There are many excellent broad-based CI activities that can be leveraged to engage MSI's. These activities are very good opportunities for MSI faculty and students to learn about the possibilities for enhancing research and education programs through CI, build CI-related skills, and to network with the CI community of educators, developers and researchers.
  - TeraGrid, NSF/State centers, OSG, OGF, SCxx, International projects (Pragma, ICEAGE)
  - So move from providing fully customized activities to modifying/using existing networks, computers (as in TeraGrid), workshops, Summer Schools – this can scale.
  - Focus on meaningful engagement of community of MSIs, individual MSIs and the underrepresented minority community, but work with outreach activities like TG EOT, EPIC, Global CyberBridges (FIU) and SACNAS
- 2) Adopting CI at an MSI requires the involvement all campus stakeholders, including administration, faculty and students. Engagement, planning, and education activities must include representatives from every stakeholder group if the effort is to be successful.
- 3) Campus visits as used in successful AN-MSI project (on networking) are a good tool for promoting CI on several levels. The visits provide an opportunity for executive awareness when the site visit team meets with the president and his management team to lay out the opportunities for enhancing campus programs through CI. A review of the existing infrastructure provides the campus valuable information about necessary upgrades that will optimize the ability of the campus to access CI resources. Finally, the team, through strategic planning sessions with the entire campus community, can help the campus with strategic decisions regarding program development and allocation of resources to move the institution toward CI engagement.

4) The Institute, and related efforts, successfully supported and should support domain science, e-science, or application-specific projects such as “CI for remote sensing of ice sheets” (CReSIS) where MSI Elizabeth City State University (ECSU) near Virginia-North Carolina border lead to CI-enablement. This CI-enabled research project was funded by CI-TEAM, helping to train and educate underrepresented minority faculty and students into leading science and CI as well as extending CI into domain sciences.

- PI Linda Hayden with co-PI’s including Institute PI Geoffrey Fox
- The project builds on the existing CReSIS a Science and Technology Center program led by Kansas University
- Provides an opportunity for MSIs to lead traditional university powerhouses into “next” generation (Cyberinfrastructure)
- It is important to note that ECSU is predominately undergraduate university with an extremely limited research infrastructure; the University of Kansas group has graduate students and domain experts but lacks expertise in Grid computing.

5) Leverage and encourage REU and related research experience activities. REUs provide the opportunity for students at MSIs to collaborate with research mentors at other institutions who are already CI users. This provides an opportunity at several levels: the students can be the “change agents” at their institutions, informing their faculty about the opportunities to do science collaboratively using Cyberinfrastructure. They can also be change agents to the research institution in broadening their involvement with minorities in science. Also, CI can help faculty at graduate institutions recruit students from MSIs through the REU-type research opportunities. The CI Institute and similar efforts should focus on this group of mainstream researchers who recruit from MSIs.

6) Encourage internship and mentoring opportunities. Internship and mentoring represents an excellent strategy for bringing MSI faculty into the CI user community. CI mentors, paired with MSI faculty, can bring them into their research teams at a pace that reflects the MSI faculty member’s prior research experience.

7) One can extend approach to Community Colleges and K-12 student pipeline. CI, particularly through tools such as visualization and scientific computing, should be brought into the science classroom as early as possible, to prepare students for this emerging “third approach to science,” CI-enabled research model that emphasizes collaboration.

8) Web 2.0 supports user driven identification of interest in CI. Web 2.0 tools can be used to make it easier for user exploration of CI-related programs and services. As a general statement, Web 2.0 should be explored as a possibility for expanding access to CI tools and communities.

9) Web 2.0 portals (gadgets) could lower entry barrier to CI resources like TeraGrid. Because Web 2.0 tools/gadgets are relatively easy to create, students can be encouraged to develop tools that access CI resources to address science education/research interests

that target the student's academic level. This is a general strategy that has been identified by the MSI CII project team, and a pilot activity is being planned for several MSIs.

10) The biggest problem is identifying MSI faculty and institutions that "can be engaged, educated, trained etc." due to the lack of time/teaching, technical and other resources; often the different NSF activities in this area work with the same rather small group of people. We see proactive projects like CI-days as one approach to this issue as well as further utilization of MSI and minority associations. Another is to develop Web 2.0 style portals for community building and scientific discovery as Web 2.0 allows a broad range of people to participate with relatively low barriers.

### **National Cyberinfrastructure Findings**

1) The effort to engage MSIs in CI must be comprehensive and inclusive. The entire national Cyberinfrastructure needs to be involved in MSI engagement efforts, not just a few components. This is consistent with the distributed resource and collaborative nature of CI, and allows multiple points of entry into the diversity of CI activity in "big" and "average" science. Resources to bring into the engagement effort include:

- TeraGrid,
- Open Science Grid
- Internet2 and National LambdaRail as well as regional networks
- InCommon (cross organization trust federation), EDUCAUSE, WCET (Western Cooperative for Educational Telecommunications) and other organizations
- Broad federal agency participation, NASA, DoE, NIH as well as NSF activities
- Industry such as Amazon S3 and Elastic Computing Cloud
- Government and academic facilities
- International activities from the major grids to communities like Open Grid Forum and WINHEC (World Indigenous Nations Higher Education Consortium)

2) Community empowerment should focus on MSI and underrepresented minority engagement in and not simply "outreach" from the broad national Cyberinfrastructure. If the entire CI domain science and development communities are recruited to contribute to the MSI community empowerment effort, there is a greater chance of actual engagement, full participation in the science research and education enabled by and development of CI.

- Such broad coverage of support education, training, brokering and accessing CI would require a National Cyberinfrastructure Operations Center (NCIOC).
- Such a center needs to be a collaboration of CI enabled science, CI resources and MSI communities with shared leadership, and not an outreach from a CI resource or just the CI community.

3) All MSI's need national cyberinfrastructure access, but it is not clear what this access requires. Each institution has different set of educational/research needs that can be addressed by different CI resources and science communities. For some, professional

development for faculty with research experience is needed. For other institutions, training in some online resources such as science portals is all that is required. For some simply equipment or instrumentation relevant to their needs are required. Note: ECSU had all local hardware removed from CI-Team proposal and instead asked to build a Science Gateway to TeraGrid. MSI access may require the development of local infrastructure for local research and education so as not to needlessly bog down national resources. Alternatively, an institution may be satisfied with web-accessible Science Gateways that “just” need a Web browser. Program review and planning is required by the institution to make this determination.

4) There are several MSI’s with the human and physical resources necessary to become national cyberinfrastructure providers. This is being explored with Navajo Technical College, University of New Mexico, Bowie State University, among others. We identify the following as necessary prerequisites:

- a. Administrative support: the president and other administrators must buy in to the idea. This requires that they understand the opportunities and responsibilities associated with being a provider – grant funded partnerships, institutional prestige, student/faculty recruitment, appropriate resource support and maintenance, etc.
- b. Technical support: rather than expect the institution to invest in additional IT support staff, other CI providers should provide technical assistance, in addition to training workshops (e.g. SC) that MSI IT staff can be sponsored to attend.

5) We may possibly need a “simpler” “more robust” CI-lite software stack. This could be developed to target the education and research needs of a broader audience than the current software stack, facilitating the broader adoption in CI. The MSI community could be recruited to participate in a portion of the development of “CI-lite.”

6) As eluded to above, a CI Operations Center is needed to help production use of CI. This could be staffed collectively by the major CI sites, and made available to any institution/faculty member wishing to implement CI-mediated services.

7) A comprehensive plan should be developed for providing systemic education and training at the faculty, graduate and undergraduate level which would be national in scope. The plan would include the following elements:

- a. CI strategic planning
- b. integration of CI into an institution’s curriculum
- c. institutional research development plans
- d. institutional CI-readiness assessments

8) Need “Centers of Excellence” to help CI-enable MSIs/Communities. CI Centers of Excellence would provide a model and source of best practices for other MSIs for incorporating CI resources into their programs. The Centers of Excellence should target multiple institutional types: graduate, undergraduate, two-year and tribal college. Each type would have a different set of education/research needs and

opportunities that can be addressed through CI, and therefore each would represent a slightly different implementation model.

## **Appendix I: Evaluation of the MSI-CI<sup>2</sup> SDSC Planning and Learning Meeting**

**January 30-31, 2006**

Evaluator: Julie Foertsch, Ph.D.

On January 30-31<sup>st</sup> 2006, the MSI-CI<sup>2</sup> team and the San Diego Supercomputer Center (SDSC) hosted a two-day “planning and learning” meeting for representatives of Minority Serving Institutions (MSIs) and cyberinfrastructure (CI) organizations interested in improving CI training and outreach to MSI faculty. Day 1 consisted of eight 45- to 75-minute presentations on cyberinfrastructure by experts in the field, some of which focused on CI more generally, others which focused on particular applications in areas like brain research, atmospheric science, or earth science. Two of the eight presentations were given by off-site presenters using the Access Grid. The goal of Day 1 was to get the opinions of the attending MSI representatives on how relevant and well-matched each presentation was to the needs, interests, and technical expertise of MSI faculty interested in using cyberinfrastructure in their teaching and research. This feedback, collected via evaluation sheets after each presentation, would be used to select, develop, and refine the presentations to better meet the needs of MSI faculty attending the MSI-CI<sup>2</sup> Summer Institute in June.

Day 2 of the meeting consisted of a brief presentation on how to access supercomputer center resources, followed by four panel discussions of 90 minutes each. The first two panels, “Developing a CI Curriculum,” and “Practice and Experience in CI for MSIs,” each had four presenters, half of which presented from other locations via the Access Grid. The last two panels, “Institutional Policy and National Issues in Engaging MSIs in CI,” and “developing a White Paper with Strategy Recommendations for Including MSIs in CI,” also included some presentation—notably one by Dan Atkins, now the NSF’s director of the new Office of Cyberinfrastructure—but were largely structured as participatory group discussions. The goal of Day 2 was to solicit the ideas of all those attending (either in person or over the Access Grid) regarding the best strategies for engaging MSIs in cyberinfrastructure in a meaningful and transformative way. These ideas would then form the basis for a white paper and the next MSI-CI<sup>2</sup> proposal.

The two-day meeting had a total of 35 attendees (including the evaluator) participating on-site at SDSC and another 8 participating via the Access Grid from three separate sites: the National Center for Supercomputing Applications (NCSA), the Argonne National Lab, and the Texas Advanced Computing Center (TACC). Seven of the on-site attendees were researchers and administrators at SDSC, and one of those plus six others were meeting planners, with four of the meeting planners representing MSIs. The remaining 21 on-site attendees included 18 MSI representatives and three CI organization representatives. On Day 1, presentation-specific evaluation forms were requested after each presentation from all MSI representatives in attendance and from all meeting planners other than the PI and the evaluator. The total number of respondents completing forms was 19: 82% of all MSI representatives in attendance. On Day 2, a meeting evaluation form was passed out to all on-site attendees, with an electronic version

available online. Attendees were asked to complete the paper form before leaving the meeting or the online version after they left. A total of 19 meeting evaluation forms were returned. Because the on-site attendance varied over the course of Day 2, a response rate for this form is hard to specify, but it was at least 75% of that day's attendees.

This report summarizes the findings from the Day 1 and Day 2 evaluation forms. The goals of this report are: (1) to describe the short-term outcomes of the SDSC Planning and Learning Meeting and participants' satisfaction with those outcomes; (2) to give the MSI-CI<sup>2</sup> planners detailed feedback about the eight Day 1 presentations so that they may select and refine the presentations that will be used during the MSI-CI<sup>2</sup> Summer Institute and develop new ones as needed; (3) to capitalize on the collected knowledge and experiences of the MSI representatives in attendance in developing CI training sessions that are maximally relevant to MSI faculty; and (4) to summarize meeting attendees' feedback regarding the best ideas and most pressing CI training needs that emerged from the group discussions.

## **1. Summary of Results from Day 1's Presentation Evaluations**

All but one of the 19 respondents who filled out Day 1 evaluation forms represented MSIs in some capacity. These forms were completed anonymously, but each respondent was assigned a subject number that allowed all of the forms completed by that individual to be linked. When respondents were asked on the first form to rate their own level of expertise in Cyberinfrastructure:

- 31.6% had never explored using CI in their research or teaching but wanted to
- 26.3% had explored using CI in their teaching or research but hadn't implemented it yet
- 26.3% had used some CI in their teaching or research but were relative novices
- 5.3% considered themselves fairly experienced at using CI in their teaching or research
- 0% were experts at using CI in their teaching or research
- 10.5% said the question was not applicable to their situation

In short, 58% of the respondents were MSI representatives who had never used CI in their teaching or research, and another 26% who had used some CI still considered themselves novices. These respondents (84% of the total) represent the primary target audience for the upcoming Summer Institute.

On the individual presentation rating forms that followed, respondents were asked to rate how well the presentation matched their own level of understanding, how relevant the presentation was to their own research, how relevant it was to the research of others at their MSI, and how relevant it was to the curriculum at their MSI. They were also asked to suggest how the presentation could be improved to better match their level of understanding, how it could be made more relevant to their research, and for which departments and research groups and which parts of their MSI's curriculum this presentation was most relevant. Because this detailed feedback will be important in

improving and targeting the presentations, the full set of ratings and comments for each presentation are provided to the meeting planners and the individual presenters are available.

On the final form of the day, attendees were asked to rate each presentation they had seen on “how important it would be to include this presentation in the Summer CI Institute for MSI faculty.” They used the four-point rating scale below:

- 0 = Not important to include
- 1 = Somewhat important to include
- 2 = Important to include
- 3 = Very important to include

This is how the eight presentations were rated, with those receiving the highest ratings listed first:

**Table 1:** Attendees’ ratings of how important it was to include a presentation in the upcoming Summer Institute for MSI faculty, on a scale of 0-3, where 0 = “not important to include,” and 3 = “very important to include.”

<b>Mean Rating</b>	<b>Rated 2 or 3</b>	<b>Title of Presentation</b>
2.76	94%	Introduction to Cyberinfrastructure and Grids
2.71	88%	Security and Shared Cyberinfrastructure
2.59	94%	Welcome to TeraGrid
2.38	81%	Data Grids and Data Management
2.12	82%	Grid Technology
2.12	76%	Virtual Infrastructure
2.07	75%	LEAD: Cyberinfrastructure in Earth Science
2.00	65%	Advanced Cyberinfrastructure to Enable Multisite/Multiscale Brain Research

The first thing to note is that all eight of the presentations received high ratings on average, with none of the ratings averaging less than a 2.00 (“important to include”). In Table 1, the four presentations with the highest ratings are listed above the bold line and those with the lowest ratings are listed below it. An analysis of the specific ratings and comments on each presentation’s evaluation sheet suggested that the main differences between the top four presentations and the bottom four presentations were the following:

- (1) The four top-rated presentations were pitched at the right level of understanding for all but one or two respondents, while the four lower-rated ones were pitched a little too high for one-fourth to one-third of respondents;
- (2) Of the four presentations that got lower average ratings overall, two were fairly technical presentations about how particular aspects of CI work, and two were fairly specific presentations about the use of particular applications in particular disciplines. These talks were well appreciated by those familiar with that discipline but were less accessible and less relevant to people unfamiliar with that



discipline. In their comments, respondents suggested that these talks would best be used as introductions for discipline-specific training sessions, to be followed by plenty of detailed examples and hands-on project work.

The presentation rating sheets also contained the following suggestions for the planners of the Summer Institute and future CI training for MSI faculty. All of these suggestions are in line with previous research on what makes faculty training most effective:

**1) Cluster workshop participants by discipline (or related disciplines like life sciences) to provide more detailed training in how to use CI applications relevant to their research.** Generalized cross-disciplinary presentations are good for administrators and those who need to be convinced to invest in CI, but it only goes so far in providing relevant information and training for the faculty who will actually be using CI tools. And because more discipline-specific presentations are only relevant to people from that discipline, grouping workshop attendees by discipline becomes necessary.

**2) Provide step-by-step tutorials and hands-on training in how to set up a high-performance computing cluster or get CI Grid access** so that faculty and IT staff leave the workshop with what they need to know to set up CI on their own campus, including how to troubleshoot what can go wrong. Give participants detailed written instructions and cue sheets to take home with them.

**3) Don't present too much new information in one day.** Many attendees noted that one can only absorb so much through presentations. These attendees emphasized the importance of contextualized examples and plentiful opportunities for faculty to work on the applications themselves. Of course, it was always the intention of MSI-CI<sup>2</sup> to provide hands-on training at the Summer Institute, but the reminder to spend less time presenting information to attendees and more time letting them try the applications themselves cannot be stated too often, as the lecture-based model of teaching is still dominant in many scientific fields. But when it comes to teaching scientific tool use, “learning is doing.”

**4) Use a moderator/timekeeper to keep presentations from going too long and discussions focused.** Most of the presentations ran well beyond their scheduled time, and a number of respondents commented on the problems this caused.

## **2. Summary of Results from Day 2's Meeting Evaluations**

For Day 2's meeting evaluation form, 17 of the 19 respondents (89%) were MSI representatives with varied levels of CI expertise, while the other 2 respondents were CI experts from majority institutions or organizations who had worked extensively with MSIs. Five of those 19 total respondents were also part of the MSI-CI<sup>2</sup> planning team, so one's interpretation of their feedback must take that fact into account. On all four of the numeric rating scales on the Day 2 evaluation form—which assessed the value of not only that day's panels but the meeting as a whole—the 5 members of the MSI-CI<sup>2</sup>

planning team tended to give higher ratings than the 14 non-planners. Hence, in the analyses below, only the ratings and statements given by the 14 non planners are presented.

When asked **their primary goal in attending the meeting**, the responses of the 14 people who were not part of the planning team could be summarized as the following (note that because some respondents gave more than one answer, the total sums to more than 14):

- 8 wanted to learn more about CI applications and consider how it might be used in their own (or their colleagues') research and teaching;
- 8 wanted to network with others interested in or already involved in CI, with an eye towards future collaborations and proposals;
- 5 wanted to get concrete information about how to connect to CI or bring it to their campus;
- 1 wanted to represent an MSI community's interests generally and further the development of CI within that community in ways that would address those interests.

When asked to rate on a 4-point scale **the extent to which those goals were met**, the responses of the 14 non-planners were the following:

- 0% = Not at all
- 14% = Met to a limited extent
- 50% = Met to a large extent
- 36% = My goal was fully met

When asked to name **other goals or benefits that came from attending this meeting**, the 12 non-planners who responded listed the outcomes summarized below:

- Networking with great minds;
- Networking with excellent people. I learned some things;
- Met with leaders in the field and made appropriate connections;
- Met new people who use CI and learned about the interdisciplinary nature of CI;
- Made contacts that will serve as CI contact person and help when needed or desired;
- Found out the objectives of the MSI-CI<sup>2</sup> consortium/institute and connected with the persons involved as PIs.
- Concrete collaborations assigned from this meeting in Grain research collaborations, K-12, and TeraGrid;
- Benefited from the people I came in contact with as colleagues and resources. Got a better idea of the "next steps" I need to take to achieve my goal and an idea of what needs to be done at my school and the community;
- Opportunity for MSIs to discuss options for advancement; opportunity to address curriculum development and how it will be used;
- Introduction to Grid Computing and possible applications;
- Tour of SDSC facility; meeting with Scott Lathrop of TeraGrid and discussion regarding SIPI NSF ITEST proposal; exchanging ideas with AIHEC; literature and presentations I can use to educate my colleagues at SIPI;

- Better understandings; optimism for change.

When participants were asked, “**overall, how valuable did attending this institute turn out to be,**” the responses of the 14 non-planners were the following:

- 0% = Not at all valuable
- 7% = Somewhat valuable
- 36% = Fairly valuable
- 57% = Highly valuable

When asked “**how effective were the panel discussions** at engaging participants in productive, relevant information exchange about the topic at hand,” the 13 non-planners who responded said the following:

- 0% = Not at all effective
- 8% = Somewhat effective
- 61% = Fairly effective
- 31% = Highly effective

Participants were also asked to describe “**the most valuable idea or suggestion that came out of today’s discussions.**” All 17 responses to this question are below:

- Working together for a common good;
- That this is a CI issue and not just an MSI issue;
- Importance of collaborations, consistency;
- Ongoing research that uses CI;
- The vision and the discussion on how to organize ourselves;
- Concept of creating/developing a MSI CI center, which all of the members of this group are part of. This is an awesome concept;
- Partnerships between powerful CyberInfrastructure organizations, e.g. SDSC, etc. & AIHEC, NAFEO, &HACU;
- Build strong partnerships with SDSC, NCSA;
- NCSA’s offer to support workshops, etc;
- The courses developed at TACC through EPIC that will be accessible to the nation. The MSI-VI by FIU through EPIC in a means of persistent engagement of the MSI community;
- Curriculum and partnerships that are already available. Have to engage MSI faculty in this effort for it to work;
- Possible creation of Stem Institute similar to Alliance Kellogg Leadership Institute;
- The structure for the next proposal;
- The white paper ideas;
- 1. To enhance curricula development. 2. Develop and implement an effective outreach program that can be used to reach the K-12 community;
- How to and discussions on working together. Statement was made, “you can have hardware, but what are you going to do with it?” This is too true.
- In order to implement Cyberinfrastructure link and research at tribal colleges, it is best if we engage persons from IT support departments and administration and invite them to the upcoming summer training.

Attendees were then asked their future plans or next steps with regards to cyberinfrastructure use at their own institution, whether they were willing to teach a session or do a presentation at the Summer Institute, and who else at their institution should be involved in CI discussions and/or training. Since this information is most valuable when linked to the particular individuals from which it came, we can provide a complete listing of each respondent's background information, CI goals, and future CI plans. Further we compiled a list of the respondents who indicated willingness to present at the Summer Institute and what topic they thought they could present on. This detailed information was used to assist the MSI-CI<sup>2</sup> team in planning future outreach activities and the upcoming Summer Institute. Of the 19 respondents who were asked about their willingness to be present at the Summer Institute, 8 (36%) answered "yes, my schedule permitting," and another 8 (36%) answered "perhaps."

In sum, the MSI-CI<sup>2</sup> Planning and Learning Meeting held at SDSC in January of 2006 achieved its primary goals for the vast majority of participants (86%) and was rated by most attendees as either "highly valuable" (57%) or "fairly valuable" (36%). The goals achieved during this meeting included networking between CI experts and MSI representatives who want to learn more about incorporating CI into their teaching and research; discussion of specific collaborative opportunities between participants, including research projects, white papers, and proposals; deeper understanding among MSI faculty and IT staff about how CI can be useful on their campuses and how to go about obtaining access; and better understanding among CI experts about how to engage MSI faculty and make CI training and tools more relevant to their needs. The detailed feedback collected through this evaluation will be used by the MSI-CI<sup>2</sup> team to build upon the aforementioned goals and develop a Summer Institute in CI training for MSI faculty that is maximally effective.

**Overall Survey for the Minority-Serving Institutions Cyberinfrastructure Institute (MSI-CI<sup>2</sup>)**

**At SDSC, June 26-30 2006**

**Summary of Results**

Julie Foertsch, Leading Edge Evaluation & Consulting

Thirty of 33 total MSI-CI<sup>2</sup> participants completed the overall survey, for a response rate of 90.9%. “Participants” were defined as Minority Serving Institution representatives or collaborators who attended MSI-CI<sup>2</sup> for one or more of its four days in order to receive training and information in cyberinfrastructure, as opposed to the CI experts who were invited to give presentations or training. The 30 male and 3 female respondents included 12 representatives from Hispanic Serving Institutions (HSIs), 11 representatives from Historically Black Colleges & Universities (HBCUs), 7 representatives from Tribal Colleges & Universities (TCUs), and one representative from a non-profit center working with MSIs. Of those who responded, 19 were faculty members (17 regular or 2 adjunct), 7 were members of the IT staff, 2 were members of the research staff, one was an educational program manager, and one was a student. Their self-reported levels of CI expertise and their goals for attending the Institute are below. For all responses reported herein, N = 30 unless otherwise specified.

Q4. Before coming to this Institute what was your own level of expertise in CyberInfrastructure (CI)?

40.0%	12	I had never explored using CI in research or teaching
16.7%	5	I had explored using CI in teaching or research but hadn't implemented it yet
23.3%	7	I had used some CI in teaching or research but am a relative novice
16.7%	5	I consider myself fairly experienced at using CI in teaching or research
3.3%	1	I am an expert at using CI in teaching or research

Q5. What was your primary goal in attending this institute? (The stated goal is in column 2, the extent to which they felt that goal was achieved is in column 1, using the scale 1=Not at all, 2=Met to a limited extent, 3=Met to a large extent, 4=Fully met. The goals are listed in order from most to least fully met).

Goal met?	Primary goal in attending
4	Meet and interact with people from other institutions.
4	To gain knowledge of CI that could be use to strategically plan for IT initiatives at the university.
4	1. To learn more about developing cyberinfrastructure at MSIs. 2. To develop new partnerships with MSIs
4	Exposure to collaborative research being done between computer science and other disciplines. The opportunity to network with researchers from other areas/institutions.
4	To learn more about the resources/expertise available, especially for participants in the Computational Astrobiology Summer School.
4	To learn how to setup/configure a grid computing lab on our campus.
4	To learn about cyberinfrastructure and explore using it in teaching my genetics and cell and molecular biology classes and in my NASA research applications.
4	To learn more about CI
4	To develop new contacts for future collaborations.

4	To learn about CI for research and how CI can be integrated into undergraduate curriculum in both applications and building it. Furthermore, I am looking ways to incorporate CI at the entry level course to attract students into CS and Math.
4	Understand the field, especially the excitement of our partners in the field.
4	To establish research collaborations with other MSI's involving CI and computational science.
4	Learn about the state-of-the-art of TeraGrid computing; GRID applications being developed at SDSC and Cal(IT2); network with other MSI faculty.
3	To learn how CI might be brought into our curriculum.
3	Learn more about CI and to build relationships with other institutions.
3	To establish future collaborations. Gain more insight about Super Computers. Determine if it is possible to implement the information acquired at the workshop for teaching and/or research.
3	To acquire additional information on CI implementation for research and teaching at my university. The ultimate goal is to institutionalize CI at the university.
3	Find out more about opportunities in research and education available through grid.
3	The above rating needs to be (if we numbered from top 1 - 5 (with 5 as most knowledge)) about a 2.25 -- don't want to mislead anyone! My overall goal was to gain some 'hands-on' experience with portals / gateways and accessing the TeraGrid and getting some ideas of ways I can introduce CI into my current course -- i.e. Computer Literacy...
3	To find how to connect to the GRID network as well as what was needed to setup a cluster at ECSU.
3	Learning about the opportunities for my faculty and students.
3	Examine new areas of research, and establish collaborations.
3	Partnerships.. and to see what other institutions are doing..
3	Network and disseminate current research
3	Starting local cooperation with the san diego super computer center for teaching purposes
3	Learn about new findings and Network with others for further collaborations.
2	Basic exposure to CI concepts and functions.
2	Learn more about the hardware aspect of the project.
2	To determine if there were uses for a 'cyberinfrastructure' at our tribal college in terms of enhancing teaching capabilities and research efforts.
2	Figuring out what are the latest advancements in CI.

Q6. To what extent was your primary goal met?

0%	0	1 = Not at all
13.3%	4	2 = Met to a limited extent
43.3%	13	3 = Met to a large extent
43.3%	13	4 = My goal was fully met

Average = 3.30

Q7. What other goals or benefits, if any, came from attending this institute? (If none, say "none")  
(6 said "none." The other 24 responses are listed below to use in reporting outcomes.)

- Wednesday's agenda was by far the best. It is great to see technology in action.
- To learn the current state of development of some key institutes such as sdsc.
- Through interactions with colleagues from other institutions which could potentially lead to collaborations in the future.
- The realization of what tools and information are needed for current undergraduate Computer Science students.
- The institute opened unexpected possibilities in thinking about CS education in a new light. I see CI as the calculus of math ed - it can be both a starting point, a motivator, and a thread. The institute also raised possible connections with participants we had not fully considered.

- The benefit of meeting other higher ed professionals with a similar interest.
- Networking with others
- Networking was able to interact with numerous professionals from various backgrounds.
- Networking and identifying potential projects and collaborations with other institutions.
- Most interesting discussions with colleagues about their research and teaching experiences.
- Meeting others with common interests and forming possible future collaborations
- Meet with many other experts in this area. I will be more involved with many related works in this area because of my participation in this workshop.
- Make contacts from MSIs to possibly foster collaborations for TeraGrid and PSC
- Made new contacts with not only MSIs but also from many of the GEON folks.
- Made new contacts and friends.
- Made contact with educators and researchers that may materialize into a mini-grant.
- Interesting contacts with other attendants, became more aware of opportunities for collaborative research, discussed approaches for grid implementation at my university that I had not considered.
- I found out about the CASS training at UH's Astrobiology Institute and was able to apply. I will be going to UH on July 23rd for 3 weeks. Additionally I was able to refer others to research being done at UCSB.
- I finished the week excited with the possibility of bringing to bear the power of CI to my classes. I have personal research interests in Genetic Algorithms, Bioinformatics, and distributed processing. Two days into the conference I found myself spending hours watching the archived conferences on MPI, Bioinformatics, and the implementation of a local Condor cluster.
- Excellent networking.
- Discussion and consideration of curriculum issues. We're facing a major shift in how undergraduate education is conducted. I got to see a bit of that.
- Benefits would include being privileged to listen to and learn from people like Larry Smarr, Geoffery Fox, Alex Ramirez, Scott Lathrop and Diane Baxter (to name a few)...I look up to and cannot help from learning from all of these people. It was a highlight of the trip to get a tour of CalIT2 -- along with the group of peers I was fortunate to have time to network/talk to and really share ideas and information -- I really gained a lot of information and sources of information.
- Learned about new applications of cyberinfrastructure. 2. Learned about new CI software.
- A greater interest in utilizing CI in astrobiology, bioinformatics and other areas within TSU and the MSI communities. 2. A greater sense of the possibilities of sharing resources and knowledge. 3. A better understanding of Higher Education within the Hispanic Tribal, and Pacific Islander communities. 4. A great appreciation of the work of Dr. Geoffery Fox and other leaders in CI and their commitment to MSIs. 5. Touring the SDSC center and the CalIT2 center to see CI in use

Q8. Rate your own interest in each of the following (listed from highest rated to lowest):

Potential CI related interests	Not Interested (1 pt)	Somewhat interested (2 pts)	Very interested (3 pts)	Of greatest interest (4 pts)	Average
Internships for MSI faculty or students at places with major CI activities	7% (2)	17% (5)	13% (4)	63% (19)	3.33
Involving faculty and research teams in CI	3% (1)	17% (5)	30% (9)	50% (15)	3.27
Understanding how to access CI resources like TeraGrid	0% (0)	23% (7)	27% (8)	50% (15)	3.27
Training and planning experiences like this	3% (1)	13% (4)	37% (11)	47% (14)	3.27

meeting					
Pursuing funding for better CI infrastructure (including clusters) at your MSI	13% (4)	7% (2)	23% (7)	57% (17)	3.23
Pursuing funding for faculty release time to get involved in CI	7% (2)	17% (5)	27% (8)	50% (15)	3.20
Involving undergraduates in CI	3% (1)	23% (7)	33% (10)	40% (12)	3.10
Curriculum and Education issues for CI	3% (1)	23% (7)	33% (10)	40% (12)	3.10
Institutional and infrastructural issues for CI	7% (2)	17% (5)	50% (15)	27% (8)	2.97
Extended visits of CI research experts to your MSI	13% (4)	17% (5)	33% (10)	37% (11)	2.93
Having CI experts do a site visit at your MSI	10% (3)	20% (6)	40% (12)	30% (9)	2.90
Providing Research Experiences in CI for Undergraduates	13% (4)	20% (6)	33% (10)	33% (10)	2.87
Extended visits of CI experts to your MSI	13% (4)	23% (7)	33% (10)	30% (9)	2.80
Pursuing funding for graduate students in CI areas	23% (7)	20% (6)	27% (8)	30% (9)	2.63
Involving graduate students in CI	23% (7)	23% (7)	20% (6)	33% (10)	2.63
Becoming a provider of TeraGrid	23% (7)	40% (12)	27% (8)	10% (3)	2.23

Q9. In general, how effective were the combination of sessions you attended in addressing the issues, challenges, and questions that are likely to arise in your and your institution's use of CI?

0%        0        1 = Not at all effective  
20%       6        2 = Somewhat effective  
63.3%    19       3 = Quite effective  
16.7%    5        4 = Highly effective  
Average = 2.97

Q11. Overall, how valuable did attending this institute turn out to be?

0%        0        1 = Not at all valuable  
13.3%    4        2 = Somewhat valuable  
36.7%    11       3 = Quite valuable  
50%       15       4 = Highly valuable  
Average = 3.37

Q13. Would you be interested in attending future CI trainings and workshops for MSI faculty?

0%        0        No  
33.3%    10       Perhaps  
66.7%    20       Yes

Q10. What could we do to make MSI Cyberinfrastructure Institutes like this more effective? (N = 22, with 8 others indicating they had no suggestions) Responses clustered by topic.

More hand-on exercises and tutorials needed (n = 7):

- Provide hands-on exercises
- Hands on implementation of CI examples.
- More, actual hands on...
- Provide more hand-on experience tutorials, e.g. examples of how to set up workflows, use of the Service Request Broker (SRB), and other elements of the Grid architecture.
- More hands-on of the use of the various CI applications presented during the sessions.



- More hands-on time for participants
- In spite of some 'frustration' at not doing the hands on, this was a good experience. For next steps, I would really like to see some 'hands on' activities and more curriculum development and sharing/

More concrete examples specific to MSIs of how they can actually get this technology installed and use it in their classrooms (n = 6):

- More active participation from MSI representatives. We got to see a lot of the work and resources available at UCSD, SDSC, and CALIT2, but only few MSIs presented their contributions or intentions.
- 1. Have a presentation by an MSI scientist that has created a new research and educational program in CI at their institute. Discuss the steps involved in dealing with administration and in obtaining funding. 2. Spending time developing a proposal to submit as a team. 3. Having the participant conduct and complete a small CI research project as a team. 4. Develop a CI distance learning course or common courses that MSI could share.
- Invite computer Scientist and Biology/Chemist from the same MSI or have more life science examples to demonstrate the use of super computers for class rooms and researchers.
- How could this be implemented, what is the impact on articulation of classes between institutions?
- Include in the sessions a ground-up explanation of what resources and equipment are needed to effectively 'get a school up and running.' Showing what the GRID is capable of is wonderful; however, if the understanding of how to begin are not there then the knowledge is useless.
- More discussion of funding sources, especially as related to MSIs and their unique challenges in obtaining external funding.

Send teams of faculty and IT staff from each MSI (n = 3):

- Fund teams from each MSI consisting of a computer science/IT faculty/staff with a research scientist to better understand how CI and the building of CI infrastructure can be used to support typical activities at the MSI (e.g., teaching and research)
- Not sure what you could do to make it more effective... The fact that many of the sessions were archived and available online was very important and it allowed me to make efficient use of my time. What I missed out on (in not attending all days) was some of the networking opportunities, and my sense is that that was truly a missed opportunity. My humble suggestion is that you continue to help foster relationships by supporting means of peer-teams/work group collaborations.
- As we discussed, it would be good to have both researchers and implementers from each MSI at these sessions, so that all the important information can be absorbed.

Improve organization/timing of sessions (n = 3):

- Organize parallel sessions in such a way that one has a chance to attend different topics.
- Shorter overall schedule, I burned out on Thursday afternoon. Smaller breakout sessions. The curriculum sessions were large and a bit under directed. This is fine to get people talking, but I would have preferred to spend a bit more time focused on one or two questions. For example, what would it really mean to turn the curriculum upside down, starting with projects to provide a reason for learning.
- Allow more time for free discussion...the first 3 days of the institute provided a 'trip to the zoo' feel. Too many presenters, too little time.

Follow up on these activities in some fashion (n = 3):

- Continue these activities to keep everybody more up-to-date and in touch.

- Re-open the digital divide issue that died once the Bush administration came into power. The digital divide is alive and well in Indian country.
- Conduct more institutes!

Advertise the Institute better (n = 1):

- Better outreach. I found out by accident, at the last minute. I am surprised nobody from U. of Puerto Rico (I have research collaboration with them) was present, and I wonder if they know about this meeting.

Q14. If you would be interested in attending another workshop, on what topic in particular? (N = 22, with some giving more than one suggestion for a topic).

Technical setup and institutional infrastructure (n = 9):

- Setting up clusters; installing the Globus Toolkit; Nanotechnology Grid projects; Bioinformatics Grid projects; CS for the Grid.
- Infrastructure resources related the CI project. Exercises illustrating the steps to installing require software.
- Hardware and software setup.
- Building mesh networks, small clusters, running programs/applications on these clusters..
- Semantic web, service-oriented architectures, service composition
- Connecting small rural institutions
- Institutional and infrastructural issues for CI; Understanding how to access CI resources like TeraGrid.
- Teragrid, Clusters, GridAccess
- Any topic dealing with the building of cyberinfrastructure at MSIs.

Hands-on training in applications (n = 6):

- CI applications.
- Hands-on Computational Fluid Dynamics applications.
- Gaining hand-on experience with the 'tools' and curriculum development and locations / access to resources. Thanks, this was a great experience for me!
- CI applications in Artificial Intelligence, GAs, MPI, parameter sweeps, processing graphics.
- Space Science in general, a half-day or full-day devoted to hands-on CI
- Hands-on sessions on applications

Curricular development (n = 6):

- Undergraduate curriculum in CI and research in computer science.
- Curriculum development -- how will we use CI in education.
- Developing CI educational coursework in Biology. Using CI in medicine (of interest to premed students at MSI's)
- Involving faculty and research teams in CI; Involving undergraduates in CI;
- Use of CI in faculty-initiated research projects in biology and chemistry, in developing undergraduate research projects, and in enhancing educational resources.
- More vivid explanations of the following: Demonstrations that could be used in Undergraduate and Graduate life science courses; Examples of how super computes have been instrumental in solving life science problems.

Outreach to get more people educated about CI possibilities (n = 3):

- I would be fascinated in a discussion about the education and outreach made possible by CI. High schools and undergraduate institutions may not be preparing most people to even consider work with CI or in CI.
- How to reach out to community with TeraGrid, especially high schools.
- Outreach, esp to undergrads and their faculty

Other (n = 4):

- Funding CI research projects at MSI's
- The role of minority scientists and women in the development of CI
- Meeting CI scientists will to visit and collaborate with MSI's.
- Involving MSI students in CI distance learning courses.

Q12. What are your future plans or next steps with regards to CI use at your own institution? Respondent's name and institution are included to allow follow-up with these individuals as feasible.

Name	Institution	Future CI plans
Larry L. Lowe	Benedict College	Make a presentation to my department faculty and students, and follow-up with getting CI into my upper level courses (genetics and cell and molecular biology) by the spring 2007.
Keith Schubert	Cal State-San Bernardino	Pursue funding and collaborations.
Jeff Thompson	Cal State-San Bernardino	Discuss with the Computer Science department how they can take advantage of the TeraGrid. Discuss with Computer Science and Biology in the planning for an undergraduate bioinformatics program.
Ernesto Gomez	Cal State-San Bernardino	I intend to ask for initial allocation on the TeraGrid for my research, with four of my graduate students. I will inform several of my colleagues of this opportunity. I intend to pursue establishment of a campus grid at my university.
Jane Curnutt	Cal State-San Bernardino	I will be working on a project that I will bring back from Cass.
Mohsen Beheshti	Cal State-Dominguez Hills	I have a limited cyberInfrastructure and would like to extend it to a point that is available for our new graduate students and also be able to collaborate with other colleagues from within and other departments as multidiscipline activities.
Dan Pleier	Chief Dull Knife College	unknown
Jared Ribble	Crownpoint Institute of Technology	Build infrastructure.
Jeaime Powell	ECSU	Setup a cluster using SGI O2 computers and the ROCKS GRID rolls.
Kuchumbi Hayden	ECSU	Creating a grid computing center
Teresa Lara-Meloy	EDC	None. But I do plan to work with an MSI interested in CI.
Derrick Wilkins	Elizabeth City State U	To engage in dialogue with our researchers to see how we might utilize CI resources in research and teaching.
Emmanuel Glakpe	Howard University	A colleague and I are in the process of submitting a proposal to fund a CI initiative on our campus.
Dar Bales	Little Priest Tribal College	We hope to participate in grants, partnerships with large schools, and future institutes.
Jan Bingen	Little Priest Tribal College	We have recently submitted a DOD grant, which, if awarded, will allow us to 'wire' the campus and increase our bandwidth, as well as building and implementing a geowall. I also plan to pursue connecting to the TeraGrid and

		developing some 'simple' - probably 'low key' activities that students can perform to introduce them to the technology and its value.
Laura McGinnis	Pittsburgh Supercomputing Center	I will be presenting a number of ideas to PSC management for possible future activities involving MSIs
Michael Ceballos	Salish Kootenai College	share information about the SDSC institute with the CS/IT personnel at our institution
Zlatko Zografski	South Carolina State U	Setting up a Grid cluster. Introducing a Grid/HPC for the graduate and undergraduate curriculum.
Lukas Buehler	Southwestern College	faculty development in bioinformatics
Bruce Smith	Southwestern College	My goal is to incorporate distributed processing fundamentals into our CS1/CS2 curriculum, investigate building a Condor cluster in our CS lab, study how our students can use a local cluster and/or the TeraGrid.
Kenneth Montoya	Southwestern Poly. Tech. Institute	form partnerships with other institutions share resources and information.
E Lewis Myles	Tennessee State U	To create a NIH or NSF supplement with collaborators.
Todd Gary	Tennessee State U	The next step is to develop a proposal for funding with several participants that attended the MSI-CI conference. The proposal and projects would focus on using CI in coursework and research.
Kim Binsted	U of Hawaii	I will include a session on CI at CASS, and probably apply for some funding.
Ongard Sirisaengtaksin	U of Houston-Downtown	Develop an undergraduate curriculum in grid computing and upgrade/maintain our grid cluster according to information from the workshop.
Arthur Maccabe	U of New Mexico	Continue trying to educate the faculty :)
Paulo Pinheiro da Silva	UTEP	To complete the implementation of CI-MINER, the UTEP approach for CIs.
Leonardo Salayandia	UTEP	Pursue extra funding for research in topics related to CI.
Nicholas Del Rio	UTEP	n/a - I have no power regarding policy at my university
James C. Turner Jr.	Virginia Tech	To work with partnerships that are dedicated to working with MSIs on the development of cyberinfrastructure.

## Ratings for Monday's MSI-CI<sup>2</sup> Sessions and Suggestions for Improvement

Total # of respondents = 21

Session	Not useful			Very useful		N	Average
	1	2	3	4	5		
Welcome and CI Overview from Anke Kamrath	0%	10%	5%	50%	35%	20	4.05
Introduction to the TeraGrid by Scott Lathrop	0%	0%	15%	40%	45%	20	4.26
Future of the Internet by KC Claffey	0%	0%	25%	25%	50%	20	4.21
Linking the Back Country by Hans Gerner-Braun	0%	0%	25%	25%	50%	20	4.21
The International Connection with PRAGMA Grid by Peter Arzberger	5%	0%	32%	26%	37%	19	3.83
Campus Grids: Access and Resource Providers by Laura McGinnis	0%	6%	17%	39%	39%	18	4.06
Security & SDSC Infrastructure with Tour by Victor Hazelwood	0%	6%	22%	44%	28%	18	3.88
Meet the Participants: Presentations by CI Scientists & Administrators	6%	0%	17%	39%	39%	18	4.06

### Suggestions for improvement:

- Really interesting conversations during and after the sessions. I'm glad that the size of the group is manageable to be conducive to conversations and networking.
- It was a very good idea to give us an overview what a grid is capable of through applications and details of grid technology including related curriculum in the following days.
- Since the audience was composed of people from various backgrounds, more explanation regarding terminology and 'how the grid is useful to end-users who are not computer scientists' might have been more helpful...at times, the abbreviation and the 'middle-ware' packages etc. seemed a bit overwhelming....It was difficult to see how this information could be applied to a typical faculty member.....
- Very good presenters. Very good material. Nice balance of technical and educational material.
- Good for those that are attending for the first time.
- Very interesting in general - I am encouraged to ask for time on the TeraGrid for my research, and to communicate its availability to others at my university.
- Overall, Monday was 'good' and in some cases -- great (ref. the 5's above) -- however, perhaps the lower scores are partially due to long sessions with loads of information -- however, understanding our limited time constraints -- and that was not the ONLY reason some sessions received lower scores (in my estimation) -- in at least one instance I felt very talked down to and that a lot of more relevant information could have been shared. Overall evaluation of sessions 4.5 & looking forward to tomorrow. Overall Monday's sessions were 5 and informative. There is very little that I would change.
- In my opinion KC Claffey was the most dynamic speaker and the information given was insightful.

## Ratings for Tuesday's MSI-CI<sup>2</sup> Sessions and Suggestions for Improvement

Total # of respondents = 20

Session	Not useful			Very useful			N	Average
	1	2	3	4	5			
Grid Technology: Software Engineering for Grids by Shava Smallen	0%	0%	29%	35%	35%	17	4.13	
Studying earthquake hazards w/ large scale simulations on the Grid by Bernard Minster	0%	0%	6%	39%	56%	18	4.47	
Grids in Biology: Bioinformatics and Medicine by Nicholas Schork	5%	5%	11%	37%	42%	19	4.00	
Computational Science and Drug Discovery by Andy McCammon	0%	5%	10%	35%	50%	20	4.26	
Data Management by Reagan Moore	0%	0%	21%	37%	42%	19	4.17	
PS I: Focus on "Data Grids" like Storage Resource Broker; Hands-on Workshop	0%	17%	17%	0%	67%	6	4.17	
PS II: Grids--Portals and Science Gateways Hands-on Demonstrations of CI	22%	11%	11%	0%	56%	9	3.38	
PS III: Essential resources prerequisites & core courses for parallel computing and CS	0%	11%	0%	33%	56%	9	4.25	

### Suggestions for improvement:

- I would like more information on a walk through for a complete setup of a GRID system including sample data compilation
- Today's presentations were much more applicable to the types of applications that might be useful on our campus. The presenters discussed specific applications in biological and chemical sciences that often require HPC....This day was very interesting..Andy McCammon's talk was the most related to my lab's research interests.
- I was VERY disappointed in the portals and gateways 'hands-on demonstration'. The speakers spent most of the time repeating material that had been covered in session on Monday and Tuesday morning and the participants were not given any hands-on time, on the portal or any of the gateways. It was a significant waste of time in what's been an otherwise very valuable workshop so far.
- I really enjoyed Bernard Minster's presentation. I had no problem following what he was presenting.
- The break-out session was fantastic. It gives us more opportunity go ask and respond to questions.
- I was extremely dissatisfied with the PS III: Grids...session -- perhaps because I understood the session description to depict it as a 'hands-on' session. I have heard a lot about what can be done and the data that can be accessed, etc. - -however, I was hoping to get some experience accessing these resources. On the other hand the evening/dinner presentation was well done, informative and I came away from it with resources and information to take home.
- Really world examples presented by leading scientists was outstanding and inspirational. Breakfast, lunch and dinner were delicious and an ideal setting for networking. Found PS III session to be very helpful. Many helpful ideas were shared that will be very helpful in integrating grids into undergraduate courses.

- I wish the OSII was more extensive, in depth with more hands on. I was hoping MSI-CI2 will provide temporary accounts for the participants and help them to get a taste of 'test drive' on the grid. I was hoping we will be assisted to apply for an account and get set up.
- The PS III session provided good interactions and information that could be immediately implemented at MSIs.

## Ratings for Wednesday's MSI-CI<sup>2</sup> Sessions and Suggestions for Improvement

Total # of respondents = 17

Session	Not useful				Very useful		N	Average
	1	2	3	4	5			
Cal(IT)2 Tour and Program by Larry Smarr, et al	0%	0%	0%	13%	87%	15	4.87	
Astronomy Cyberinfrastructure by Roy Williams	0%	0%	27%	47%	27%	15	4.00	
PS I: Compute Grids- "Rocks-A-Palooza"	50%	25%	0%	0%	25%	4	2.25	
PS II: Chemical Informatics	0%	50%	13%	0%	38%	8	3.25	
PS III: Teaching CI to undergrads/grads: Grid Informatics resources, prereqs, core courses	0%	0%	22%	44%	33%	9	4.11	
Wrap Up: 10-minute summaries by Parallel Session moderators	13%	0%	44%	13%	31%	16	3.50	
Dinner: Building Partnerships for Future Collaboration	8%	0%	23%	38%	31%	13	3.85	

### Suggestions for improvement:

- Absolutely the best day
- I was a bit disappointed that the Rocks session was cancelled. I was really looking forward to seeing a workflow as to how to actually get the teraGRID setup and running. Hopefully this discussion will take place on Thursday.
- I think the site tour got lots of us excited about the possibilities of collaboration - and i think the conversation in the afternoons seem promising in terms of a continuing collaboration among the MSI reps.
- Marlon did an excellent job of trying to 'bridge' the work being done in the computer science realm with institutional research efforts.
- Rocks-a-Palooza didn't happen - the speakers never showed. Once again, it was a disappointment that there was no hands-on opportunity to get into grid technology.
- Rock-A-Palooza was canceled. I really need more hands-on network and server hardware implementation.
- The tour and the Chemical Informatics was 5 and informative
- In the future, if we can coordinate when Larry Smarr will talk, I will work hard to bring upper administration from my university to hear what he has to say.
- Best part of Wednesday was the tour and information gleaned there. Very disappointed in the fact that the 'hands-on' Rock session had been cancelled -- still reeling from Tuesday's disappointments in not being able to get a 'hands-on' look at gateways/portals -- especially interested in traversing Access Grid. However, learning and experiencing some hands-on activities was what brought me here. I do enjoy 'hearing' how/what people do with the tools -- but would really like to have some experience with them -- after all, isn't the intent of these efforts for us to take this back to our institutions and implement some of these technologies!! Building Partnerships for collaboration dinner was dismal -- food was good!!
- We need a summary of PS III. The summary should help us in planning our CI/CS incorporation into our UG and grad curricula. We need some good guidelines from people with experience in CI/CS integration. We need to learn about the 'best practices'.



- Have the PS III give 5 suggestions for building cyberinfrastructure at MSIs.

## Ratings for Thursday's MSI-CI<sup>2</sup> Sessions and Suggestions for Improvement

Total # of respondents = 14

Session	Not useful				Very useful		N	Average
	1	2	3	4	5			
Computational Astrobiology by Kim Binsted	0%	8%	17%	25%	50%	12	4.17	
Other Participant Presentations	0%	10%	10%	30%	50%	10	4.20	
PS I: "Computer Science of Grids" Panel (Peer-to-Peer Multicore SemantiGrid)	0%	0%	33%	33%	33%	3	4.00	
PS II: Bioinformatics its resources at SDSC and its connections to Astrobiology	0%	17%	0%	0%	83%	6	4.50	
PS III: CI for Lower-level Undergrads, Community Colleges & K-12 Teachers	0%	0%	40%	40%	20%	5	3.80	
Wrap Up: 10-minute summaries by Parallel Session moderators	0%	20%	60%	0%	20%	10	3.20	
BOF Lunch with Team Tables	0%	0%	27%	18%	55%	11	4.27	
Final Wrap-up and Next Steps	0%	10%	30%	50%	10%	10	3.60	

### Suggestions for improvement:

- The Thursday dinner was absolutely wonderful!
- Good potential collaborations established. The food was excellent for all 4 days. It far exceeded my expectations.
- Excellent presentations. The discussion in the presentations was interesting, and the working lunch was a useful opportunity to network with other members of our group. Keep up the good work!
- Found the sessions on Astrobiology to be extremely helpful. Having several participants in this area and interacting with the astrobiology speakers: Kim Binsted and Forest Rohwer may lead to a strong future collaboration. This collaboration could involve interactions between diverse MSI (HBCU, Tribal College, HSI and Pacific Islander University).