



NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, VA 22230

October 7, 2011

Dear Dr. Khonsari,

Thank you for your participation and presentation at the recent Reverse Site Visit (RSV). The RSV is an important mechanism that the NSF EPSCoR Office uses for project management and oversight, and for providing feedback and guidance to awardees. The NSF EPSCoR Office would like to complement you and your fellow team members for your professional approach to the RSV activity.

The attached report is based upon the RSV panel's review of written materials (complete proposal, review panel summary, review analysis, original award letter, RII Track-1 strategic plan, most recent annual report, and budget) provided prior to the meeting, the oral presentation made by the project team, visual aids supporting that presentation, and subsequent discussion with the team. Please review the report and share it with the appropriate individuals in your jurisdiction to develop responses and action plans that address the issues and recommendations identified in the RSV report. Please contact Denise Barnes (NSF EPSCoR, Senior Staff Associate, dbarnes@nsf.gov), if you have any questions related to the panel's report or if you need further clarification regarding the requested responses.

The NSF EPSCoR Office would like to receive your plan to address each of the RSV panel's recommendations listed at the end of the report no later than November 7, 2011. This plan should address how you will respond to each recommendation, and the timeline for doing so. Responses should be sent to Denise Barnes. Please note that your next Annual Report for the RII Track-1 award (and subsequent reports, as appropriate) should include the progress on the RSV recommendation responses and action plans.

Sincerely,
Jeanne Small
On behalf of the NSF EPSCoR Office

Reverse Site Visit (RSV) Report

NSF EPSCoR Jurisdiction:	Louisiana
RII Award Number:	EPS-1003897
Principal Investigator:	Khonsari
RII Program Solicitation:	NSF-09-570
Reverse Site Visit Date:	September 8, 2011

Précis

The Louisiana team has made excellent progress in the first year of the RII Track-1 project. The team has leveraged very effectively the previous investments from other NSF projects. The RII project aligns with the State Science and Technology Plan. The research program as presented was quite complete and comprehensive. The Science Drivers (SDs) address important and potentially useful technology areas that can provide the state a competitive advantage. Leveraging this with industry partnership must be emphasized. Stronger participation of students and faculty at Historically Black Colleges and Universities (HBCUs) and community colleges in more meaningful collaborative activities would enhance LA-SiGMA's impact. Integration of education and research is adequate. LA-SiGMA leadership team has been responsive to challenges, working to meet them in a timely manner. The team is encouraged to make investments to increase their technology transfer to industry.

Progress to Date

Intellectual Merit

LA-SiGMA has made a major investment in the use of high-performance computing (HPC) to characterize and design materials at many scales. They are in a relatively unique position to address this problem because of the existence of the HPC resources associated with Louisiana Optical Network Initiative (LONI), the now-terminated TeraGrid, and the now-initiated Extreme Science and Engineering Discovery Environment (XSEDE). The development of cybertools and algorithms to address extreme multiscale scientific problems is both challenging and needed. Indeed, this is the objective of several active centers around the country. The LA-SiGMA team has the necessary expertise to be competitive with all of these teams. Indeed, most of the Principal Investigators (PIs) are funded externally through individual grants and through a few collaborative grants.

It is clear that the LA-SiGMA researchers are advancing science in the areas covered by their SDs. It was generally appreciated that there is transformative potential in much of the work, and there was particular enthusiasm with SD1.

Broader Impacts

The participating institutions include a growing research linkage among the research institutions and the other institutions of higher education, including three of Louisiana's HBCUs; increasingly, partner institutions are collaborators rather than competitors for support and development of infrastructure resources. The participation of pre-college and community college groups should be ramped up in the second year of the project. Using baseline data in the RSV presentation was an improvement upon the presentation of year one data alone in the annual report.

Efforts and reporting of public engagement can be strengthened. The breadth of participation of LA-SIGMA faculty in public lecturing is unclear, and the numbers of attendees at events is unknown, as is the impact of attendance.

Each of the three Science Drivers has the potential for significant societal contributions as well as the potential for commercial development.

Progress towards goals and objectives:

1. Strategic Fidelity and Impact

The research thrusts on materials, energy, and drug delivery, bound together by an underlying computational theme, connects well with the Core Enabling Technologies and Translational Research Domains identified in *First Louisiana*, Louisiana's Science and Technology Plan. The research thrusts connect well with the State's industrial connection to energy and national priorities in this area. The panel noted favorably the potential relevance of a recent research result to modeling oil spill cleanup, a problem of regional if not national importance. The emphasis on materials and computational tools for materials aligns well with the National Genome Initiative. Louisiana leverages well LONI and the Center for Computation and Technology at LSU. Computational research also utilizes national computing facilities through XSEDE. Additionally, experimental efforts leverage the Institute for Micromanufacturing at Louisiana Tech and the Advanced Materials Research Institute at the University of New Orleans (UNO). Educational activities, particularly course development, are well aligned with the research.

2. Value Added

There is potential for significant value added in terms of research, education, outreach, and economic development both locally and throughout the jurisdiction. The biggest impact will certainly be at the individual institutions associated with LA-SIGMA, and the laboratories engaged in research activity. The vast majority of research funding for the current award is dedicated towards funding personnel.

The impact of these expenditures has the potential to lead to new software for materials modeling, and research solutions to important problems in drug delivery, energy, and materials. The software tools will be posted on a web site and may be broadly disseminated. The direct investments in research will primarily affect only the institutions involved in LA-SiGMA, and predominantly the labs of the investigators involved on the grant (who have been very productive with 5 manuscripts published, 8 grants awards, and 23 presentations given). The increase in research productivity may enhance research competitiveness in the partner institutions. In addition, the cyber conferencing equipment might facilitate collaboration throughout Louisiana. Once the cyber conferencing equipment is purchased, it will be more obvious how these cyber tools facilitate collaboration.

Because investigators are funded only for collaborative work, the award potentially increases collaboration. It is early in the award to determine the impact. Based on preliminary assessment data, the increase in co-authoring papers from 20% to 23% before and after one year of the award was not considered significant. However, the roughly 50% increase in the use of cyber tools to communicate from before to after one year of the award suggests that communication between investigators on different campuses has increased with the EPSCoR funding. There is some concern about a lack of flexibility for introducing new PIs into LA-SiGMA, or shifting priorities between research projects; most of the funds appear to be earmarked to specific investigators. It is suggested that the team explore additional mechanisms to increase the number of participants, collaborators, and collaborations.

In education and outreach, the team capitalized on programs at the Statewide EPSCoR Office in running Research Experiences for Undergraduates (REU), Research Experiences for Teachers (RET) and outreach activities, leveraged a Partnerships for International Research and Education (PIRE) grant from NSF, and initiated new graduate degree programs. All of the education and outreach activities should add value to both the participating institutions and the jurisdiction.

In the area of advancing economic development, there are a variety of programs to stimulate industry partnerships by providing small pools of money. The scientific areas are relevant to the state economy. Thus there is potential for economic development. To date, however, the impact of these activities cannot be assessed. It is not obvious that the team has strategized on how to best capitalize on industrial collaboration.

3. Cyberinfrastructure Plan

Louisiana (in part through past EPSCoR funding) already had a significant state-wide cyberinfrastructure in place prior to this EPSCoR project. The project leverages existing cyberinfrastructure and aims to acquire a relatively small amount of new cyberinfrastructure – mainly, new “condos,” and HD Video equipment – related to specific SD needs.

The collaboratorium was provided as an example of cyberinfrastructure, although it appears to be a physical location in which groups of investigators can be colocated while using cybertools. The number, geographic spread, and size of the collaborative teams would likely be enhanced if more effort were made to increase the connectivity of team members using cyber tools.

Overall, the cyberinfrastructure plan has been proceeding according to plan. The integration with national-scale infrastructure is strong.

4. Diversity Plan

LA-SiGMA is commended for its diversity plan. Its structure and connection to the overall project reflect thought and understanding of the need for mechanisms to assure that there is sustainability of the diversity mission throughout the project components. First year data established a baseline for assessing improvement for the future; clear metrics for assessing sustainability, recruitment and retention of diverse groups (faculty and students both within and across institutions) should be established beyond monitoring participation rates (in research) or attrition. Particular attention should be devoted to increasing representation of underrepresented groups in the research as well as the primarily undergraduate institutions (PUIs).

5. Workforce Development Plan

The strong collaboration across institutions is important for expanding a research and innovation culture that otherwise would lack the critical mass for world class research. The graduate research efforts linked across institutions add research breadth and expertise that can provide excellent research expertise. The STEM students at primarily undergraduate institutions can provide a base for industrial expertise, which can support recruitment of new industries to Louisiana. The state academic partnerships aimed at economic development are strong, and are likely both to provide more trained workers and to help create innovative jobs. It is suggested that the project continue holding “listening sessions,” in which faculty and students hear from industry, and then develop follow-up seminars in response. Those seminars could be internet-broadcast to all institutions and archived for future use by classes, business venture planning, and research teams.

6. External Engagement Plan

The use of a web portal and new media to engage the broader community is admirable, but the sites do not appear to have sufficient content (in terms of quantity and frequency of updates). The LA-SiGMA team is encouraged to invest in methods seeding content creation by their participants, particularly their undergraduate and graduate students.

The project outcome stating that sixty Speaking of Science (SoS) presentations were delivered in the last year is certainly laudable and should be continued. However, it would be helpful to augment this reporting with more detailed disaggregated data. For

example, how many different PIs delivered these lectures? How many different venues were utilized? How many individuals were impacted? What are the demographics of these cohorts? Are there pathways for participants to follow-up perhaps using LA-SiGMA-sponsored web sites or social media?

7. Evaluation and Assessment Plan

The evaluation plan is commendable, as is the organizational structure for implementation of assessment initiatives. It is suggested that the evaluation team leverage the program logic model for determining appropriate metrics for monitoring program progress (for formative evaluation) and for providing the explanatory power of emerging summative findings. Moreover, the evaluation design should be driven by specific evaluation questions, which are rethought each year. Cohesion among initiatives should also be assessed, using specific evaluation questions. For example, the evaluation focus should include a connection between evidence of research-specific progress with the diversity and outreach initiatives. Finally, the results of evaluations should be used formatively, and in a timely fashion.

8. Sustainability Plan

LA-SiGMA has an adequate plan for sustainability, but there is not yet enough active outreach to industry, and implementation of the plan has been limited thus far. The budget for the first year was only \$32K from EPSCOR funds. It was not clear from the annual report exactly how the \$782K in the Sustainability Plan from the Cost Contribution category (for Pilot projects) was distributed and whether those projects will contribute to sustainability. This is a particular question given that the Management Team expressed concern about not having enough funds for a number of the other programs under their “Seed Funding and Emerging Areas” activities, which form the core of their Sustainability Plan.

More active interactions with existing industry partners who will commercialize the intellectual property produced through LA-SiGMA is highly recommended. There were no industry partners in the Links with Industry and National Labs (LINKS) program in the first year. There are no industries involved in the industrial liaison team. Including representatives of industry is essential for realizing the commercial potential of the LA-SiGMA work.

The results of LA-SiGMA work has great potential to improve U.S. manufacturing competitiveness, especially through the use of new materials algorithms and code in designing, fabricating and manufacturing new products and processes. This can be supported by a closer LA-SiGMA liaison to industry, in order to apply the results of the research to materials designed for industrial applications.

During the presentation it was mentioned that one group is working with the company producing FLUENT, a computational fluid dynamics code. This should happen throughout the different project areas to commercialize/license software. It was also

mentioned that the work in catalysis for the production of biofuels has linkages to two small businesses which should aid in tech transfer. More such linkages in other focus areas are encouraged. The drug delivery work should be of interest to the biotech industry.

The interactions with industry in workshops should help direct some of LA-SiGMA's work toward areas of interest to industry and this activity is commended. Follow-up with industry and establishment of partnerships should come out of this activity.

9. Management Plan

There is an excellent management plan. The director and management team have the experience, vision, and capacity to lead this project. The involvement of the EPSCoR governing committee and its external advisors is positive. The Louisiana Board of Regents has supported a well coordinated management strategy, integrating pure research with economic development and diversity enhancement.

10. Progress toward Strategic Plan

The project is making clear progress on all of its strategic goals. The project is commended for its very proactive efforts to recognize and mitigate challenges.

Feedback to Project Team

Summary

The leadership team has worked effectively in the first year of the project. The research activities and graduate level education have been well integrated, with an inter-institutional and interdisciplinary Ph.D. program now under review. Increased attention should now be directed to improved integration of precollege and undergraduate education. Investments to date are certainly appropriate to increasing research capacity.

Specific Recommendations

1. The participation of pre-college, community college groups, and students at HBCUs should be ramped up in the second year of the project and should continue as a priority thereafter.
2. A systematic strategy for increasing industrial collaboration should be developed and implemented.
3. Modes of public engagement should be strengthened, and the reporting and evaluation of that engagement made more complete.

4. Evaluation questions should be rethought annually and mechanisms developed to ensure that evaluation results are used formatively.