MEMORANDUM
DATE: **December 19, 2005**
TO: Bernice Anderson**,** Senior Advisor on Evaluation
                 Directorate for Education and Human Resources
FROM: Sherry Farwell
SUBJECT: COV for Experimental Program to Stimulate Competitive Research (EPSCoR)
                 COI and Diversity Memo

The Committee of Visitors report for the EPSCoR Program was approved at the EHR Advisory
Committee meeting held at NSF on November 2-3, 2005. The COV consisted of five members selected
for their expertise related to the goals of the program. They provided a balance with respect to the type
of institutions supported through the program, gender, and representation from underrepresented groups.
The following table shows the main features of the COV's diversity.

Category of COV Membership	No. of COV Members in Category
Member of EHR Advisory Committee…………..	……1…….
Institution Type:	
❑ University……………………………………	……3….
❑ Four-year College……………………….	………….
❑ Two-year College………………………..	………….
❑ K-12 School or LEA…………………….	………….
❑ Industry…………………………………..	……2…….
❑ Federal Agency………………………….	…………
Location	
❑ East……………………………………..	… 2…
❑ Midwest/North …………………………	……3
❑ West………………………………………	…………
❑ South…………………………….………	…………
Gender	
❑ Female……………………………………	……2……
❑ Male………………………………………	……3……
Race/Ethnicity	
❑ White………………………………………	……3……
❑ Black………………………………………	……1……
❑ Hispanic………………………………..	…………
❑ Asian………………………………………	……1……
❑ Pacific Islander…………………………..	…………

The COV was briefed on Conflict of Interest issues and each COV member completed a COI form. COV
members had no conflicts with any of the proposals or files. (or, if they did, use 'Proposals and files were
not available to COV members in those cases where the member had a COI and members were not
allowed to participate in discussions of actions with which they had conflicts.')

National Science Foundation

Education and Human Resources Directorate

Experimental Program to
Stimulate Competitive Research
(EPSCoR)

Committee of Visitors
26 - 27 July 2005

Final Report
16 Aug 2005

Committee Members

Chris W. Busch - Chair   Missoula, MT

Michael P. Doyle   University of Maryland

Norman L. Fortenberry   National Academy of Engineering

Sally K. Mason   Purdue University

Kerri T. Vierling   University of Idaho

INTRODUCTION

a.   Background

The Committee of Visitors (COV) met at the National Science Foundation (NSF) 26 and 27 July 2005 to review the agency's Experimental Program to Stimulate Competitive Research (EPSCoR). The COV focused on a five year period, FY 2000 through FY 2004. Procedures for the COV were provided by NSF and documented in Subchapter 300 of the NSF Manual (Committee of Visitors Reviews). These focus on:

- A.   The integrity and efficiency of the NSF EPSCoR Program's processes & management;
- B.   Outputs and outcomes of NSF investments in the EPSCoR Program; and
- C.   Other topics related to the NSF EPSCoR Program.

Specific COV review comments and recommendations on these three items are provided in Sections A through C of this report below.

The first of the two days began with welcome and introductory comments from Sherry Farwell (EPSCoR Program Office Head) and Donald Thompson (Acting Assistant Director, Education & Human Resources (EHR)). Bernice Anderson (EHR/OAD, Program Director for Evaluation) provided guidance on the COV process.

Chris Busch (COV Chair) summarized the process of selecting jackets for the COV review, and then reviewed the assignment of a subset of these jackets to each COV member as described below.

Care was taken to avoid conflicts of interest (COI) in assigning specific jackets to COV members. Adjustments in specific COV jacket assignments were made at the beginning of the review process based on COI assessments of the assignment matrix by COV members.

The COV then commenced reviewing the selected jackets. The COV took periodic breaks from the jacket review process to share findings. Preparation of report commenced in the afternoon of the first day.

Between the first and second day, COV members prepared input as "homework" that was discussed and incorporated in the report on the second day.

The second day focused primarily on completing the draft COV report. Additional reviews of jackets and other materials provided to the COV were reviewed to support report preparation.

On the second day at 2:00 PM, the COV presented an oral summary of its draft report to Sherry Farwell (EPSCoR Office Head), Bernice Anderson ((EHR/OAD, Program Director for Evaluation), and EPSCoR Office representatives. The meeting adjourned at approximately 3:30 PM.

b.   Jacket Sample Selection

The COV Chair was provided EPSCoR jacket information in spreadsheet form for the following seven EPSCoR Program activities:

Research Infrastructure Improvement (RII)
RII Planning Grants
Grants
Cooperative Agreements
Unsolicited Proposals
Co-Funded Projects
SBIR/STTR Awards

Information provided for each of these jacket categories is summarized in the table below. The three right columns identify the number of jackets in each program category selected by the chair for COV review.

NSF EPSCoR Jacket Data and Selections: FY 2000 – FY 2004									
	Total Funding			All Jackets			Selected Jackets		
EPSCoR Component	Funding $	% of $		No. of Awards	% of Awards	Declines		Awards	Declines	Total
RII	$201,383,328	47.00		27	1.99	13		27	13	40
RII Planning	1,491,514	0.35		8	0.59	2		8	2	10
Grants	15,955,878	3.72		31	2.29	22		3	2	5
Coop Agreements	33,168,270	7.74		22	1.62	3		6	1	7
Unsolicited Props	3,886,373	0.91		18	1.33	7		2	1	3
Co-Funded Projects	161,385,234	37.67		1141	84.14	?		30	0	30
SBIR/STTR Projects	11,180,918	2.61		109	8.04	?		5	0	5
Totals	$428,451,515	100.00		1356	100.00	47		81	19	100

The specific jackets selected are listed in Appendix A of this report. Six of the 100 requested jackets were unavailable to the COV.

The EPSCoR Office does decline certain requests for co-funding of projects from other NSF Directorates. The COV was provided some information on these declined requests, but was not given a complete set of these declines with jacket numbers. Similarly, requests for SBIR/STTR funding were declined on occasion, but SBIR/STTR decline information was not provided to the COV. Hence, a "?" is inserted for the number of co-funded and SBIR/STTR declines for the "All Jackets" category in the table above.

In addition to the seven project areas cited in the table above, information was provided to the COV on outreach activities performed and sponsored by the NSF EPSCoR Office, including outreach by personnel from NSF Divisions and Offices apart from EPSCoR.

c.   Other Information Provided the COV

In addition to the jackets selected for review, the COV was provided with:

An EPSCoR background document summarizing activities during the COV period;

EPSCoR Office Annual reports for the five years of the COV period;

Other miscellaneous information;

Verbal information from EPSCoR staff as requested.

d.   Summary of Findings and Recommendations

The COV found integrity and efficiency of EPSCoR Program processes and management to be satisfactory for the period of its review. The COV applauds the new directions and innovations for the EPSCoR Program initiated by the current EPSCoR Office Head and his team.

Similarly, the COV found the outputs and outcomes of NSF EPSCoR Program investments to be satisfactory.

Detailed COV findings and recommendations for the NSF EPSCoR Program are presented on the following pages of this report. Recommendation highlights are listed immediately below.

1.   An initiative to improve EPSCoR staff scientific/technical credentials and skills is necessary to meet emerging Program needs.

2.   The EPSCoR Program should have a dedicated Advisory Committee (constituted as a subcommittee of the EHR Advisory Committee) to resolve challenging issues such as: graduation/progression of jurisdictions, launching new initiatives (e.g., Strength Based Research Collaboratives (SBRCs)), resource allocations, program evaluation and internal NSF organizational issues.

3.   The COV recommends the initiation of programs for "competitiveness" building, and strongly endorses the SBRC concept presented to the COV by the EPSCoR Head, Sherry Farwell.

4.   The review of large RII-type proposals should be more rigorous. The review process should include site visits and include a sufficient number of reviewers with adequate qualifications in the specific scientific areas proposed for research.

5.   The NSF EPSCoR Program Office should document more thoroughly the process and bases for award and decline co-funding decisions.

6.	The NSF EPSCoR Program Office planning and plan implementation processes should be more rigorous and consistent for both competitive programs and office operations.

7.	The COV recommends that the NSF in general and the NSF EPSCoR Program Office specifically increase their capacity to evaluate and measure outputs and outcomes. To initiate this function will require the EPSCoR Office to seek guidance from professionals skilled in the design and implementation of program/project evaluation.

8.	NSF should encourage and facilitate the reporting and collection of reviewer ethnicity data.

9.	EPSCoR jurisdictions should be encouraged and incentivized to develop more focused activities, and to engage their EPSCoR Committees more meaningfully.

10.	The value and necessity of continuing the awarding of planning grants for new jurisdictional entrants should be reassessed.

FY 2005 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)

Date of COV:	26 & 27 July 2005
Program/Cluster:	Experimental Program to Stimulate Competitive Research (EPSCoR)
Division:	Office of Experimental Program to Stimulate Competitive Research (EPSCoR)
Directorate:	Education and Human Resource (EHR)

Number of actions reviewed by COV:
 	
    Awards: 81 Requested (4 not provided to COV; see note in introduction)
 	
    Declinations: 19 requested (2 not provided to COV; see note in introduction)
 	
    Other: (See notes below)	

Total number of actions within Program/Cluster/Division during period being reviewed by COV:
 	
    Awards: 1356
 	
    Declinations: 47
 	
    Other: None (Except for outreach – see note in introduction above)	

Manner in which reviewed actions were selected: See introductory notes above.	

PART A.   INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES AND MANAGEMENT

A.1 Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) In the early years of the COV review period, the proposal review process appeared to be less rigorous and detailed than in later years. The COV was concerned with the quality of some of the reviews received from external reviewers, especially with regard to the large RII proposals. In some cases, reviewer comments were not in sufficient detail or length to justify the ratings and, thus, it was difficult to ascertain how final decisions were made. Co-funded proposals, which were budgeted at significantly lower levels than RIIs, received more lengthy and detailed scientific critique than did the RII proposals in some cases. The COV recommends that site visits (or reverse site visits) be a required part of the decision making for the large awards (e.g., RII). The site visits could be formed by a combination of personnel from the EPSCoR Office, other NSF offices, and outside service providers. It is recognized that this approach may require extending the "time to decision" interval.	Yes.
2. Is the review process efficient and effective? There is tension between the goal for a six month decision period and the need for detailed scientific critique. The COV suggests that mail reviews be solicited in some way for evaluation of specific scientific content. Externally solicited reviews would mitigate the need to augment the panel review team to include more content experts than might otherwise be feasible.	Yes.
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines?	Yes.

The COV noted that the detail provided by the reviewers (RII in particular) improved and responded more fully to the two NSF criteria in the later years of the COV review period.	
4. Do the individual reviews (either mail or panel) provide sufficient information for the principal investigator(s) to understand the basis for the reviewer's recommendation? This was especially true for co-funded proposals that received reviews through the individual R&RA Directorates. However, for the RII proposals, occasionally individual reviews provided inadequate information, which was often offset by multiple reviews and excellent synthesis by the Program Directors and/or Office Head.	Yes.
5. Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation? In cases where proposals were declined, it was clear which criteria were not met. The Program Directors were explicit in summarizing the reasons for requesting that a proposal be reworked and resubmitted.	Yes.
6. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? The COV noted that the Program Directors did an excellent job of synthesizing comments from all reviewers who participated via written reviews and panel discussions. However, additional EPSCoR Program Director scientific/technical capabilities would enable a more complete set of feedback for proposers. The bases for award/decline decisions for co-funding (by EPSCoR and other Offices/Directorates) proposals should be documented more thoroughly in the EPSCoR Program Office.	Yes.

7. Is the time to decision appropriate? However, see Section A.1.1.	Yes.
8. Discuss any issues identified by the COV concerning the quality and effectiveness of the program's use of merit review procedures: Given EPSCoR's mission to enhance research competitiveness, it would appear appropriate that the EPSCoR Program Office seek out reviewers more prominent in their fields, including those from research extensive institutions. In some cases it was difficult to determine the level of expertise of panel members. A short bio for review panel members would be helpful in evaluating their qualifications.	

A.2 Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers.
Provide comments in the space below the question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	YES, NO, DATA NOT AVAILABLE or NOT APPLICABLE
1. Have the individual reviews (either mail or panel) addressed both merit review criteria? See A.1.4.	Yes.
2. Have the panel summaries addressed both merit review criteria? Addressing the two merit review criteria improved greatly during the period that the COV has been asked to review.	Yes.

3. Have the review analyses (Form 7s) addressed both merit review criteria? See A.2.2.	Yes.
4. Discuss any issues the COV has identified with respect to implementation of NSF's merit review criteria. None were identified.	

A.3 Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers? However, the COV believes that a more optimal review process for the $9 million RII awards would result by using a larger number of reviewers with an appropriate set of scientific backgrounds. The EPSCoR management team might consider other approaches for facilitating reviews of these very large projects, such as those used by NSF ERCs, STCs, and SLCs, and the NIH program project review process.	Yes.
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? See comments in A.3.1 above.	Yes.
3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of	Yes.

institution, and underrepresented groups? NSF should continue to work on facilitating and encouraging reviewer reporting of ethnicity. While the geographical and institutional diversity of reviewers was relatively easy to determine, it was more difficult (and sometimes impossible) to determine whether underrepresented groups were always well represented.	
4. Did the program recognize and resolve conflicts of interest when appropriate? The attention to the detail of this issue is laudable.	Yes.
5. Discuss any issues the COV has identified relevant to selection of reviewers. See issues raised above.	

A.4 Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	**APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE**
1. Overall quality of the research and/or education projects supported by the program. The COV noted that the funded RII projects represented a range of scientific qualities that were supported, and all of them met the stated NSF and EPSCoR review criteria. All of the co-funded proposals were evaluated thoroughly by the Directorates, and were deemed by the review panels and/or Program	Appropriate.

Directors as fundable quality proposals. Other project and/or PI features consistent with NSF criteria frequently were cited in the award decision. (See also Section A.4.14.) However, the different EPSCoR investment programs during the 2000-2004 COV review period are heavily concentrated on "capacity-building". The program should consider the augmentation of these "capacity-building" programs with complementary programs for building capability and competitiveness. The proposed SBRC program appears to be an excellent step in providing the current infrastructure building programs with such a connection to the desirable enhancement of capability and competitiveness.	
2. Are awards appropriate in size and duration for the scope of the projects? The RII award amounts are consistent with other infrastructure grants from NSF and other agencies. However, the impacts from such RII awards could be improved by focusing them on a limited number of research-based areas. Hence, a more thematic approach consistent with the jurisdictional environment and EPSCoR goals would contribute to greater impacts and hence provide the foundation for enhanced capability/competitiveness.	Appropriate.
3. Does the program portfolio have an appropriate balance of: • ***High risk projects?*** By their very nature, RII proposals from jurisdictions that are attempting to build capacity involve risk.	Appropriate.
4. Does the program portfolio have an appropriate balance of: • ***Multidisciplinary projects?*** The vast majority of RII proposals involve collaboration and some degree of multidisciplinary effort. In fact, a hallmark of the EPSCoR initiative, almost from its inception, was the use of large grants (or contracts) to stimulate cross-institution and cross-discipline interactions. This was true well before the current strong emphasis placed on multidisciplinary research at research universities, and the COV applauds EPSCoR for being well ahead of the curve in this regard.	Appropriate.

5. Does the program portfolio have an appropriate balance of: • **Innovative projects?** The level of innovation in some of the EPSCoR projects (especially RII) could be improved, even though they are infrastructure (capacity building) based. For example, novel ways of utilizing the infrastructure, of attracting new research partners with this infrastructure, of using this infrastructure for greater innovation-based endeavors, should be more in evidence in the proposals and projects. How these would be accomplished also should be addressed in proposals. Some examples are presented in Sections B1, B2 and B3.	Appropriate.
6. Does the program portfolio have an appropriate balance of: • **Funding for centers, groups and awards to individuals?** The balance of support for co-funded proposals for individual investigators and RII awards for centers/group activities is consistent with the infrastructure goals for the EPSCoR Program.	Appropriate.
7. Does the program portfolio have an appropriate balance of: • **Awards to new investigators?** Excellent attention is paid to new investigators and new faculty startup costs.	Appropriate.
8. Does the program portfolio have an appropriate balance of: • **Geographical distribution of Principal Investigators?** There is the perception of undue pressure upon the EPSCoR program to fund awards in every eligible jurisdiction. A second related issue is the steady increase in the number of eligible jurisdictions, straining limited resources.	Appropriate.
9. Does the program portfolio have an appropriate balance of: • **Institutional types?**	Appropriate.

In a few cases, the EPSCoR jurisdictions are taking advantage of having access to students from Minority Serving Institutions and those serving other student populations (e.g., community colleges, high schools), particularly where outreach activities are concerned. This should be encouraged wherever good opportunities might exist. However, as a further step EPSCoR jurisdictions might be encouraged to adapt the Joint Faculty Appointments mechanism used in Louisiana as a means to strengthen links between faculty at Minority Serving Institutions and Research Extensive institutions.	
10. Does the program portfolio have an appropriate balance of: • ***Projects that integrate research and education?*** The outreach components of some of the RII proposals incorporate strong experiential education projects involving students at all levels from PreK-16.	Appropriate.
11. Does the program portfolio have an appropriate balance: • ***Across disciplines and subdisciplines of the activity and of emerging opportunities?*** See A.4.4. Also, the vision of the current Office Head is one that will continue to expand the opportunities to work across the disciplines in emerging areas of local and regional priority.	Appropriate.
12. Does the program portfolio have appropriate participation of underrepresented groups? The COV identified several examples (notably Alaska, Idaho and Louisiana) that were excellent in using local resources and broadening participation by underrepresented groups. The COV also supports Vermont's inclusion of "rural poor" as a population needing attention, in addition to nationally underrepresented groups, and acknowledges that there may be other "locally defined" categories that are deserving of consideration.	Appropriate.
13. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports.	Appropriate.

Some of the best examples of local/regional priorities are addressed within RII proposals and SBIRs. Direct relevance of local talent to addressing regional workforce development issues, economic development opportunities, and state-wide economic priorities can be found in proposals emanating from Alaska, Idaho, Kansas and Nebraska, for example, as well as other EPSCoR jurisdictions. RII proposals that were declined often failed to include acknowledgment of regional or niche expertise and/or workforce and economic development. EPSCoR is explicit in including "value added" as a criterion for support, and addressing issues of regional and/or national priority are definitely value added approaches.

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14. Discuss any concerns relevant to the quality of the projects or the balance of the portfolio.

Again, EPSCoR criteria for RII proposals include a "quality in context" criterion which provides flexibility for EPSCoR jurisdictions at different stages of development to build needed infrastructure. Quality thus varies more widely for these proposals than would be normal for co-funded or other large NSF center proposals.

A.5 Management of the program under review. Please comment on:

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1. Management of the program.

The quality of the EPSCoR Program management continued to improve during the period reviewed by the COV. The COV anticipates that this trend will continue with the new leadership of the EPSCoR Program Office.

The COV applauds the performance of the EPSCoR Program Office team as evidenced in the documentation they provided both before and during the COV event. The COV strongly recommends that the NSF EPSCoR Program leadership continue striving to strengthen the EPSCoR staff credentials to meet the emerging complexities and opportunities associated with the Program.

The COV strongly recommends that EPSCoR Program Management personnel perform more on-site and reverse site visits to support program evaluation, management and optimization.

2. *Responsiveness of the program to emerging research and education opportunities.*

The SBRC initiative presented to the COV by the EPSCoR Office Head is an excellent evolution of the EPSCoR Program to meet emerging research and education needs in an environment appropriate to the targeted jurisdictions. The new SBRC initiative drives the requirement for a high level of scientific and technical capability for EPSCoR Program Directors. The COV strongly encourages implementation and support for this initiative. The COV also recommends that the EPSCoR Office hold meeting(s) with the EPSCoR community on the vision and anticipated mechanism for the SBRC initiative.

3. *Program planning and prioritization process (internal and external) that guided the development of the portfolio.*

It is not obvious to the COV that EPSCoR program planning and resource allocation was optimized during the period of the COV review. Strong and sound peer-reviewed research proposal preparation should be the responsibility of the experts within the federal agencies, which includes the Program Directors. For instance, was there a strategic plan developed prior to or during the period of review? Does the program management team have the needed flexibility to make adjustments to the program that are in the best interest of the NSF as well as the jurisdiction? Can Congressional oversight be accommodated in such a way that appropriate planning for the future can be conducted in a manner consistent with the goal of promoting stronger research resource development within the EPSCoR jurisdictions?

The COV recommends that the NSF EPSCoR Program initiate a dedicated Advisory Committee constructed in a way that would provide answers and guidance to the questions posed above. This Advisory Committee properly populated and utilized would provide key assistance to the EPSCoR Program Office in formulating policies and plans and in developing implementation strategies.

4. *Additional concerns relevant to the management of the program.*

The EPSCoR objectives cited in the annual reports exhibit variations from year to year that are not based on rigorous planning. Similarly, the rationale for EPSCoR Program decisions especially early in the COV review period was not evident in some cases. The COV recommends a more rigorous EPSCoR Program planning process and articulation of this plan to NSF and the EPSCoR community.

PART B. RESULTS OF NSF INVESTMENTS

B. Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes (nuggets) as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

B.1 OUTCOME GOAL for PEOPLE: Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."

The $100 million annual investment that is NSF EPSCoR has affected literally thousands of scientists, students, and citizens across vast expanses of the U.S. and its jurisdictions. Indeed, the dollars expended on this program virtually ensure that previously underserved areas are receiving, in some cases, considerable attention in building infrastructure and capacity within the STEM disciplines. There are some outstanding examples within several of the jurisdictions of very fine programs that include traditionally underrepresented groups, such as Native Americans in Alaska and Idaho, in research and educational endeavors led by very fine scientists and engineers.

Examples of successful EPSCoR outcomes for the "People" goal follow.

The Alaska RII project (0092040) resulted in education and human resource programs that supported undergraduate, graduate and postdoctoral students. Partnerships with colleges and rural high schools having predominantly native student populations were expanded.

The Kentucky RII project (0132295) included a statewide fellowship program for minorities and underrepresented groups. A minority pipeline program for including faculty and undergraduate students from HBCUs and other regional universities in Kentucky's research programs was extended to HBCUs beyond Kentucky.

The Vermont RII project (0236976) includes an outreach program involving high school students and teachers, diverse student populations, baccalaureate institutions, the private sector, and public policy. An additional outreach program was designed to increase the diversity of the undergraduate student population in Vermont by building on an ongoing partnership with a Bronx high school. The project includes a focus on rural poor of Vermont who are eligible for summer job internships and math/science institutes.

B.2 OUTCOME GOAL for IDEAS: Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."

EPSCoR is a program that supports both "big" ideas (large, collaborative RII proposals) and "more" discrete ideas (co-funded individual investigator proposals). The range is enormous and the vast array of ideas that has been supported cannot be adequately summarized in

reasonable space. What is clear from reviewing RII jackets in particular is that where there is visionary leadership within an EPSCoR jurisdiction, there is also evidence of progress toward the ultimate and elusive goal of "graduation/progression." In the recent proposals reviewed by this COV, it is clear that some of the jurisdictions are now very successfully connecting infrastructure needs and growth with economic development and service to their local and regional communities. Basic research in co-funded proposals is of high quality, competing within the mainstream of cutting edge research that is typically funded by the NSF.

Examples of successful EPSCoR outcomes for the "Ideas" goal follow.

The RII project (0132626) developed new insights into the suitability of various nanomaterials for device and sensor applications in electronics, optoelectronics and magnetics. The work led to the first theoretical model of nanospring formation, first measurements of nanomechanical bending of single polymer nanowires, new spintronic materials, new core-shell nanoclusters with very high specific magnetic moments, new capabilities for depositing metals and oxides in nano-voids, and novel uniform nanowire arrays and magnetic dots. These innovations hold promise for revolutionizing current technologies through nanomaterials. In addition, the project's innovative new approaches to neural network hardware design offer solutions to a number of size, speed, and power consumption problems that have balked the significant development of neurocomputers. Using the technology developed, it becomes possible to build special-purpose neurocomputers capable of mimicking in fine detail many biological processes involving thousands of neurons. The project developed new circuits for biomimic neurons and biomimic neural networks, including a basic biomimic artificial neuron, a new class of neurons and neural networks based on a "forgetful logic" circuit, and a VLSI implementation for image processing using pulse-coded neural networks. With the exception of the forgetful logic neurons, these innovative designs are centered around a newly patented capacitor-free-leaky integrator circuit.

The Oklahoma RII project (0132534) led to development of a new method for processing semiconductor laser materials. The technique involves bonding an epitaxial layer structure, grown by molecular beam epitaxy (MBE) and containing nanometer-scalled quantum wells, to the tips of copper bars held together In a vise assembly, removing the growth substrate, and then separating the bars to obtain cleaved epitaxial structures. Outcomes of this work will enable improved semiconductor laser devices that will create new products.

The West Virginia RII project (0132740) enabled research achievements related to the use of biomolecules as diagnostic and therapeutic agents, including the development of human signatures for security purposes.

B.3 <u>OUTCOME GOAL for TOOLS:</u> Providing "broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation."

A hallmark of the RII proposals has been the ability of institutions to develop core facilities, add state of the art equipment and laboratories, and hire new talent into areas of traditional

and emerging strength within the EPSCoR jurisdictions. This has required that proposals be appropriately focused, while at the same time, the level of funding provided allows for massive and rapid infrastructure development and acquisition of core equipment that might otherwise be out of the financial reach of some institutions. In some cases, the development of new "tools," such as Nebraska's effort to develop a test bed for ERP (Enterprise Resource Planning) development, is of huge potential value to institutions around the world.

Examples of successful EPSCoR outcomes for the "Tools" goal follow.

The University of Arkansas project co-funded with the Geosciences Directorate (0116485) established the Stable Isotope Laboratory (UASIL), a new non-profit research facility aimed at providing a state-of-the-art laboratory for scientists, facilitating analyses of isotope samples for institutions across the country, and offering training of undergraduate and graduate students. The new laboratory has made significant contributions to research, including the analysis of over 8,500 samples from University of Arkansas (Fayetteville) and other in-state laboratories, research laboratories at 16 major institutions across the country and three U. S. Government facilities.

The University of Hawaii RII project (0237065) provided equipment that led to a weather monitoring network. The system provides for continuous data feeds on regional climate conditions through a wireless network of weather stations/repeaters into an ecoinformatics database program at the Manoa campus. Partnering with K-12 schools and other organizations (Nature Conservancy, the Environmental Protection Agency and the US Geological Survey broadens and deepens the impacts of tools developed on this and related co-funded projects (0237365).

The New Mexico RII project (0132632) improved computer connectivity and communication among New Mexico's institutions. This strengthened the infrastructure for natural resource analysis and management, and for nanoscience. This also helped to remove the barriers to competitive research and to related educational and economic development.

B.4 OUTCOME GOAL for ORGANIZATIONAL EXCELLENCE: Providing "an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices."

The aggressive leadership and planning activities initiated by the new EPSCoR Office Head and staff toward the end of the COV review period are evidence of contributions by the EPSCoR Program for achieving the NSF goal of "organizational excellence." This approach to the challenges and opportunities facing EPSCoR will lead to achieving the critical indicators for organizational excellence:

  (1) operation of a credible, efficient merit review system;

  (2) utilizing and sustaining broad access to new and emerging technologies for business application;

  (3) developing a diverse, capable, motivated staff that operates with efficiency and

integrity; and

(4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

PART C. OTHER TOPICS

C.1   *Please comment on any program areas in need of improvement or gaps (if any) within program areas.*

Item A: The COV recommends that the EPSCoR Program Office increase its capacity to continuously measure outputs and outcomes of funded projects, and that this function then be expanded and made an integral part of the annual program evaluation. This may require additional staff/personnel in the EPSCoR Program Office.

EPSCoR jurisdiction committees appear to play a very nominal role in virtually all of the proposal jackets and projects reviewed. The COV believes that these committees (properly constituted) can play a major role in crafting projects that meet the objectives of the EPSCoR Program and provide optimal benefit to the jurisdictions. The COV recommends that incentives and requirements be put in place to draw these committees into a more active role in preparing proposals for and administrating RII projects.

Item B: From the beginning, the notion that a jurisdiction would one day "graduate" from EPSCoR has always been a topic of conversation both within the NSF and across the jurisdictions. It is time to rethink what it might mean to "graduate." Clearly, a fixed definition of graduation would be a moving target, especially in an environment where jurisdictions are still being added to the EPSCoR family. The current Office Head has articulated a vision of "programmatic graduation/progression," which necessarily includes the evolution of the EPSCoR programs themselves as infrastructure continues to grow. This vision should be further developed, vetted, and eventually implemented. The COV believes that an external advisory committee would be helpful in promoting the development of a vision that includes "graduation/progression." The COV recommends that such a committee be constituted and charged soon.

Item C: The practice of co-funding proposals provides leverage, flexibility and contributes to capacity building in very positive ways. This practice should be continued.

Item D: Given the upward trend in the NSF funding cut-off for EPSCoR participation by jurisdictions, the value and necessity of continuing planning grants for new entrants should be reassessed. While the COV appreciates the value to NSF of facilitating the detailed strategic planning and staffing which typically occurs with their support, it is not clear to the COV why, in fact, NSF should be supporting activities which appear to represent fundamental self-investments in proposal development.

Item E: The COV is concerned that the rigor, oversight, and documentation of the EPSCoR co-funding initiative has declined over time. Award jackets from later years in the COV review period (2000-2004) do not document the evaluation criteria and judgments used in making co-funding award/decline decisions as well as was done earlier in the COV review period. Whether the solution is to return to unified oversight of this activity within a single program officer or simply enhanced guidance to program officers under the current dispersed management model is an issue an EPSCoR Advisory Committee should address.

Item F: While the EPSCoR program officer staff has undergone a significant expansion in

recent years, and while the staff added have given every indication of being diligent and attentive, it is not clear that the Office is properly benefiting from the level of scientific research and administrative expertise required in a program for which the primary aim is to improve research competitiveness.

A related issue is the large variation in research competitiveness within a given EPSCoR jurisdiction. Is the intent to raise the overall level of competitiveness of all (or a large subset) of jurisdictional institutions, or to invest in 1 or 2 flagship institutions? This is an issue an EPSCoR Advisory Committee should address.

Item G: The per institution rate of proposal submission by EPSCoR institutions is low compared to NSF-wide averages. Part of this may be attributable to the very low rates of submission by new-entrant EPSCoR institutions, but it seems that more effort must also be made to increase participation in NSF-wide grant opportunities to EPSCoR investigators.

Item H: Given that some within the Foundation apparently believe EPSCoR to be an "entitlement" program imposed by external actors, the EPSCoR Program Office is advised to re-adhere to the advice given by the Director's Review Board at its December 4, 2001 meeting to more accurately indicate the history of EPSCoR as an NSF-initiated activity, adopted by other agencies, and then authorized by the Congress.

C.2   Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

Item A: The COV views EPSCoR co-funding of "mainstream" NSF proposals as an effective mechanism in achieving EPSCoR Program-specific goals and strongly recommends that the practice be continued. The fraction of EPSCoR resources allocated to this activity should be carefully evaluated as part of the larger EPSCoR planning activity cited elsewhere in this report.

Item B: During the COV review period, EPSCoR laid out five analysis criteria (quality in context, value added, sustainability, outreach strategy and management plan) in addition to the two primary analysis criteria of the NSF (intellectual merit and broader impacts). The EPSCoR programs have been scrupulous in adhering to these standards in their reviews. Proposals have routinely been turned back if criteria are not adequately addressed.

Item C: The Program Directors appeared to have exercised discretion in co-funding projects in order to maximize the opportunity for EPSCoR jurisdiction investigators to benefit from funding based on the information provided to the COV. However, the COV recommends that a more rigorous and well documented process be re-established for the co-funding decision making.

Item D: Not every jurisdiction has a clear vision for meeting the NSF's broadening participation goal. However, a number of the jurisdictions developed innovative programs and novel ways of incorporating underrepresented groups into their programs or, conversely, inventing programs that will enhance the success and productivity of individuals from underrepresented groups in STEM research. The COV recommends continuing focus

to achieve broadened participation of underrepresented groups in jurisdiction EPSCoR Programs.

C.3 Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

Item A: The issue of the location of the EPSCoR Program within EHR was raised by the 2000 EPSCoR COV without a recommendation.

As the federal funding picture becomes increasingly constrained, the question of EPSCoR's organizational placement must be revisited. Optimal location within the NSF organization is essential for the EPSCoR Program to achieve its mission and objectives, and for EPSCoR to contribute to the NSF goal of "organizational excellence." While EHR is unquestionably a research program, nonetheless EHR is the appropriate home for a program that seeks to broaden institutional participation. EHR has budgetarily housed programs that were administered by the R&RA Directorates (e.g., Model Institutions of Excellence – MIE). R&RA Directorates or the Office of Integrative Activities (OIA) could budgetarily house EPSCoR while maintaining its programmatic administration by EPSCoR staff within EHR.

The COV does not have adequate time and data to elaborate on a more specific recommendation, but believes such a recommendation and its advocacy would be an appropriate function for a dedicated EPSCoR Program Advisory Committee.

Item B: The recent experience with Tennessee re-iterates the point raised in several recent EPSCoR annual reports about the need to address the increased number of states seeking "EPSCoR-like assistance through their congressional delegations" (see FY-2003 annual report). Given the likely budgetary constraints to be imposed on EPSCoR in the coming years, the program runs the danger of not being able to serve its core clientele with the limited funds available if the number of eligible states and
institutions continues to increase. At some point, the Foundation must more fully address infrastructure, capacity, and geographic distribution in its other grant programs. One solution might be for the Foundation to re-organize some of its existing programs in order to create an EPSCoR-like program that used "institutional competitiveness" rather than "state competitiveness" as the primary definitional criterion for support.

C.4 Please provide comments on any other issues the COV feels are relevant.

Item A: The COV believes the issue of "eligibility" for and "graduation/progression" from the EPSCoR Program are important to the long term integrity of the EPSCoR Program. As with C.3 (organization) above, the COV believes this issue is an excellent candidate for a dedicated EPSCoR Advisory Committee to address and recommends this approach.

Item B: In the early years of the COV review period, the COV noted the repeated use of a relatively small number of reviewers. It is recognized that such a procedure allows reviewers to build familiarity with particular EPSCoR states and to see progress (or lack thereof) over time. Nonetheless there are concerns that have to be balanced. Beyond the issues of the ability of the relatively small pool of reviewers to offer insightful and detailed

scientific critique across the range of research areas raised earlier, there is the concern that there is insufficient injection of new viewpoints in to the review process. The COV recommends an examination of the relative merits of rotating in at least 25% new reviewers each year.

Item C: EPSCoR represents an unexploited resource within NSF. A strong case can be made that the EPSCoR grantees:

- were early pioneers in pursuing inter-institutional cooperation and interdisciplinary research collaboration,

- have taken bold and innovative steps toward broadening participation (with emphasis on the difficulty challenges among university students AND university faculty), and

- have demonstrated successful mentoring of new faculty as PIs.

NSF is encouraged to carefully analyze EPSCoR's policies and processes to see what aspects may be adapted to other NSF programs. For example, the twin emphases on infrastructure development and co-funding could be adapted to programs for building research competitiveness in Minority Serving Institutions (e.g., Centers for Research Excellence in Science and Technology –CREST).

More broadly, it would appear that the Foundation could usefully exploit EPSCoR's popularity to build support for the types of initiatives it would like to see expanded across the Foundation. EPSCoR could become a useful incubator for piloting and building understanding at the policy level for research initiatives that NSF would like to undertake more broadly. Furthermore, were EPSCoR institutions to take the leading role in such initiatives, it seems likely that their ties to non-EPSCoR research competitive institutions would be enhanced.

Item D: Additionally, EPSCoR staff appeared to have coordinated with EPSCoR related offices in other federal agencies. The COV recommends continued efforts for improved interactions between EPSCoR related programs at other agencies for the benefit of EPSCoR jurisdictions and NSF.

Item E: The SBRC concept currently being explored by the EPSCoR office is compelling. However, the COV believes that careful consultation with EPSCoR jurisdiction committees as well as workshops with individual campuses may be highly advisable in order to make sure that the target community fully understands the intent and implications of the program. We also suggest that SBRC grantees be expected to submit a Centers proposal (either to NSF or another agency) prior to the expiration of the SBRC grant.

C.5   *NSF would appreciate your comments on how to improve the COV review process, format and report template.*

The COV recommends that the EPSCoR Program Office provide materials to the COV in advance of the COV via electronic media (e.g., CD or website). COV member access to

eJackets also is recommended. These steps would enable a more thorough review of available data by COV members, and lead to a higher quality COV report.

SIGNATURE BLOCK:

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For the NSF EPSCoR Committee of Visitors
Chris W. Busch, Chair