

INSTITUTE FOR PUBLIC POLICY AND BUSINESS RESEARCH
THE UNIVERSITY OF KANSAS

**SECOND ASSESSMENT OF THE SCIENCE, ENGINEERING,
AND MATH INFRASTRUCTURE
AT THREE UNIVERSITIES IN KANSAS:
RESPONSE TO BARRIERS TO RESEARCH**

prepared for

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A copy of this report and a complete copy of the the Infrastructure Database for Kansas State University, the University of Kansas, and The Wichita State University may be obtained from the Institute for Public Policy and Business Research, 607 Blake Hall, University of Kansas, Lawrence, Kansas 66045.

EXECUTIVE SUMMARY

In September, 1992, the state of Kansas became the 17th state to be included in NSF's EPSCoR program (Experimental Program to Stimulate Competitive Research). NSF awarded \$4.44 million over three years to strengthen Kansas' competitiveness for federal R&D dollars. The state has budgeted \$4.5 million in matching funds for the three year period of the grant. In Kansas, the federal R&D dollars mainly concern the three universities: Kansas State University (KSU), University of Kansas (KU), and The Wichita State University (WSU).

As part of the planning and development of the NSF EPSCoR grant proposal,¹ an assessment of the barriers to research at these three institutions was undertaken. The results of the assessment were published in a 1992 report.² The report identified several issues as crucial to enlarging the science, engineering, and mathematics (SEM) research enterprise and increasing the state's external funding.³

This second report is a continuation of the assessment. Sections 2 and 3 of the report focus upon understanding the SEM faculty and key university administrators' perceptions of barriers to research and the infrastructure supporting research at KSU, KU, and WSU. Faculty perceptions were assessed using a written questionnaire and administrators were interviewed. The report also provides data base information (Section 1) regarding the status of SEM faculty salaries (compared to peer institutions), faculty demographics (rank, age, number of women and minorities), graduate enrollment and degrees awarded, grant activities and dollars awarded (compared to other Big Eight institutions), and grant awards by source and discipline area.

Results of the faculty survey suggest that, while EPSCoR funds have obviously helped a number of faculty, changes made to remove barriers either have not been in place long enough to have an effect or are too small in scope to be noticed by a large number of faculty. Based upon faculty perceptions, the following barriers to research and grant activity continue to exist:

¹ *Planning Grant for the Experimental Program to Simulate Competitive Research in Kansas*. May, 1991.

² Stella, M. E. *Assessment of Science and Engineering Infrastructure at Three Universities in Kansas: Identification of Weaknesses and Barriers to Research* (Report No. 195), Lawrence, Kansas: Institute for Public Policy and Business Research, University of Kansas, 1992.

³ *K*STAR Grant for the Experimental Program to Stimulate Competitive Research in Kansas*, August, 1992.

- * Rewards for grant submissions and funding;
- * Support for development and administration of grants;
- * Funds for repair, replacement, and purchase of equipment;
- * Access to technical support and services;
- * Adequate facilities, especially for engineering;
- * Adequate support for graduate students;
- * Competitive salaries for faculty.

Interviews with administrators revealed that they are aware of the serious barriers that hamper faculty efforts to expand and strengthen research and grant activities. Administrators' ability to respond is limited by a lack of resources. Key findings include:

- * Administrators are aware of uneven extramural funding across departments;
- * Young faculty hired recently show promise for developing funded research programs;
- * Equipment, facilities, and personnel issues continue to be serious barriers to research productivity;
- * Limited resources are being stretched as much as possible by pooling resources (equipment, etc.). Other measures used to encourage research and grant activity included salary adjustments for productive faculty, and creation of seed and bridging funds (to support those trying to gain funding for a new project or to maintain a research program between grants);
- * Very tight or shrinking budgets make it difficult to make improvements in the undergraduate teaching mission, the graduate teaching mission, and the research mission of the universities.

University administrators continue to search for funds to provide salary adjustments, to fund equipment, to create and increase seed funds and bridging funds, and to improve support services. Despite these efforts, the barriers that face Kansas' three universities will remain largely unchanged without major efforts to:

- * Make grant activity an institutional imperative. The administrative leadership at all levels should be sending a coordinated, consistent message regarding the importance of building areas and research teams competitive in national and international arenas.
- * Address the problem of limited resources that make improvements in the undergraduate education mission, the graduate education mission, and the research mission of the universities difficult. The infrastructure required to support these missions is inadequate, creating internal concern that the research mission cannot

receive the support needed to grow in an increasingly competitive extramural funding environment. Graduate, especially doctoral, education must be strengthened to drive the research mission.

- * Provide competitive salaries and tuition assistance/remission for graduate research assistants in order to improve the ability to recruit quality graduate students. Faculty salaries also need to be adjusted to competitive levels.
- * Improve technical support and services, equipment, and facilities.
- * Remove regulations that hamper purchase of research equipment.
- * Increase the participation of women and minorities in science, math, and engineering; and increase the number of women and minorities earning advanced degrees.
- * Improve grant development and administration support services to minimize the effort individual researchers must expend upon the routine aspects of grant writing.
- * Reward proposal writing and grant submissions as well as the products of research (publications) to stimulate grant activity.
- * Continue efforts to provide seed funds and bridging funds and use them to encourage proposal development and extramural funding.

While it is premature to expect large changes as a direct result of EPSCoR, and perhaps even unrealistic in view of the EPSCoR dollars relative to the total R&D enterprise, the significance is the EPSCoR "process." The process has focused attention on the barriers to research and the question of federal R&D funding. It is also enlarging the base of key individuals within the state who understand the issues and who are working to make Kansas more competitive.

INTRODUCTION

EPSCoR's goal is to bring science, engineering, and math (SEM) research endeavors in EPSCoR states to nationally competitive levels. EPSCoR states have not, in the past, competed for their fair share of federal R&D research dollars. For example, federal R&D funds for all 50 states averages \$38.30 per capita, Kansas averaged \$18 per capita in 1990. Kansas and other EPSCoR states need to broaden the base of R&D capability, enhance the R&D capacity, and bring about permanent, systemic changes in how research is conducted. EPSCoR states are required to identify and address barriers to research.

In order to assess progress made or steps taken to address barriers to research described in the 1992 report², a plan was developed to provide annual assessment of the status of science, engineering, and math research and infrastructure at the state's three Ph.D. granting institutions. A database was established to monitor human resource development, facilities, and grant activity. This database was designed to provide information necessary to describe the SEM infrastructure. To assess what has been done to address the barriers to research, SEM faculty were surveyed and key administrators were interviewed at Kansas State University, the University of Kansas, Lawrence campus, and The Wichita State University.

This report continues to focus on issues identified in 1992. No reasonable consideration of the barriers identified in 1992 would expect that such difficult problems would be solved in the seven months that have elapsed since Kansas became an EPSCoR state. However, assessment revealed that the problems and issues are receiving attention and important steps (reported under Administrative Perspectives in this report) have been taken to address these issues. This report includes the following:

1. SEM Infrastructure. The database summarizes SEM personnel, faculty salary levels, graduate enrollment and degrees, facilities, and grant activity.
2. Faculty Perspective. This section summarizes the results of a survey that assessed faculty perceptions and descriptions of conditions regarding grant development and support, the reward system, research equipment, facilities, technical support and services, research personnel, and barriers to research.
3. Administrative Perspective. Key administrators' description of the institutional responses barriers to research productivity are summarized.

²Stella, M. E. *Assessment of Science and Engineering Infrastructure at Three Universities in Kansas: Identification of Weaknesses and Barriers to Research* (Report No. 195), Lawrence, Kansas: Institute for Public Policy and Business Research, University of Kansas, 1992.

SCIENCE, ENGINEERING, AND MATH INFRASTRUCTURE

Using data provided by the three institutions, a database for the State was created. The data included in that database are as complete and accurate as possible. All data reported for the University of Kansas include the Lawrence campus only.

Personnel

At its three Ph.D. granting institutions, the state of Kansas has 1,093 science, engineering, and math faculty (Table 1). Four hundred ninety-seven of those are full professors, 281 are associate professors, and 315 are assistant professors (see Appendix A for a detailed table of personnel by title or rank). Fifteen percent are women and 22 percent are minority (Table 2). Other personnel contribute to the SEM research effort. In addition to faculty, directors of research units, academic staff (nontenure track scientists), research assistants and associates, post doctoral fellows, technical support staff, museum curators, etc. contribute to the SEM infrastructure. These people increase the SEM personnel numbers to 3,480. Thirty percent of all SEM personnel (faculty plus others) are female and 13 percent are minorities (see Appendix A, SEM Personnel Demographics for KSU, KU, and WSU).

Salaries

Low salaries place Kansas's doctoral granting institutions in a poor competitive situation for attracting and retaining quality faculty. Faculty salaries in Kansas are below the average salaries of faculty at peer institutions. For example, Table 3 shows that salaries at KSU and KU are 85 percent to 88 percent of those at peer institutions.² These salary data highlight the seriousness of the problem facing Kansas. Low salaries have a demoralizing effect that affects productivity.

Graduate Enrollment and Degrees

The fall 1992 graduate enrollment of 2,787 in science, engineering, and math at the University of Kansas and The Wichita State University are presented in Table 4. The total of 2,787 showed little change over 1991 levels (2,702). Forty-one percent of those enrolled were female and 8 percent were minorities (Table 5). Minority enrollment did not increase from 1991 to 1992 (see Appendix A Graduate Enrollment Demographics).

²KSU's peer institutions are Colorado State University, Iowa State University, North Carolina State University, Oklahoma State University, and Oregon State University. KU's peer institutions are University of Colorado, University of Iowa, University of North Carolina, University of Oklahoma, and the University of Oregon.

Table 1
NUMBER OF SEM FACULTY
(Fall, 1992)

GROUP	KSU	KU *	WSU	TOTAL
Science	339	295	132	766
Engineering	110	76	46	232
Math	31	38	26	95
TOTAL	480	409	204	1,093

* Lawrence campus only
Source: Institutional databases

Table 2
NUMBER OF SEM WOMEN AND MINORITY FACULTY AT KU AND WSU *
(Fall, 1992)

GROUP	SCIENCE	MATH	ENGINEERING	TOTAL
Female	153	3	10	166
% OF TOTAL	20%	3%	4%	15%
African American	5	0	2	7
Hispanic	4	4	3	11
Asian/Pacific Is.	66	17	36	245
Am.Ind./Alaskan	2	0	0	12
TOTAL MINORITY	77	21	41	275
% OF TOTAL	10%	22%	18%	22%

* KSU data not available
Source: Institutional databases

Table 3
COMPARISON OF PEER INSTITUTIONS' AVERAGE FACULTY SALARY
FY 1992

	KSU	KU
Weighted average with instructors	\$41,553	\$45,871
Weighted average of peer institutions	\$49,010	\$52,127
Kansas institutions as % of peer institutions	85%	88%

Source: Institutional databases. WSU data not available.

Table 4
SEM GRADUATE STUDENTS ENROLLMENT
(KU-Lawrence and WSU, Fall, 1992)

GROUP	KU	WSU	TOTAL
Science	1,161	641	1,802
Engineering	597	285	882
Math	61	42	103
TOTAL	1,819	968	2,787

Source: Institutional databases

Table 5**SEM WOMEN AND MINORITY GRADUATE STUDENTS ENROLLED
(KU-Lawrence and WSU, Fall, 1992)**

GROUP: KU & WSU*	SCIENCE	MATH	ENGINEERING	TOTAL
Male	804	65	772	1,641
Female	998	38	110	1,146
% FEMALE	55%	37%	12%	41%
Caucasian	1,117	49	432	1,598
African American	36	0	7	43
Hispanic	29	0	7	36
Asian/Pacific Is.	29	2	21	52
Am.Ind./Alaskan	5	2	2	9
TOTAL	1,216	53	469	1,738
TOTAL MINORITY	99	4	37	140
% MINORITY	8.1% **	7.5%	7.9%	8.0%

* KSU data not available

** Number of African American, Hispanic, Asian/Pacific Island, American Indian/Alaskan students divided by Caucasian plus all of the above.

Source: Institutional databases

Table 6 presents the number of science, engineering, and math degrees awarded in 1992. Forty-one percent of the bachelor degrees awarded were earned by women (Table 7), and only 9 percent were earned by minorities. Of those earning graduate degrees, an even smaller percentage were women and minorities. Detailed presentation of degree data can be found in Appendix A (SEM Bachelor Degrees, Masters Degrees, Ph.D. Degrees). These data suggest that more women and minorities should be encouraged to obtain degrees, especially graduate degrees in science, math, and engineering.

Table 6

1992 SEM DEGREES: KSU, KU-LAWRENCE, AND WSU COMBINED

GROUP	BACHELOR	MASTERS	Ph.D.
Science	1,902	293	173
Engineering	891	223	37
Math	59	23	9
TOTAL	2,852	539	219

Source: Institutional databases

Table 7

1992 SEM DEGREES AWARDED TO WOMEN AND MINORITY STUDENTS

GROUP: KU AND WSU *	BACHELOR	MASTERS	Ph.D.
Female	1,178	170	66
% OF TOTAL	41%	32%	30%
African American	32	5	1
Hispanic	32	4	0
Asian/Pacific Is.	75	3	1
Am.Ind./Alaskan	12	0	0
TOTAL MINORITY	151	12	2
% OF TOTAL **	9%	4%	3%

* KSU data not available

** Number of African American, Hispanic, Asian/Pacific Island, American Indian/Alaskan students divided by Caucasian plus all of the above.

Source: Institutional databases

Facilities

Space available for science, engineering, and math research in 1992 included 1,303,741 square feet of lab area, greenhouses, and animal space (Table 8).

Table 8

**FACILITIES AVAILABLE FOR SCIENCE, MATH, AND
ENGINEERING RESEARCH:
1992 NONCLASS LAB AREA, GREENHOUSES, AND ANIMAL SPACE**

Group:	Square Feet: *			
	KSU	KU	WSU	TOTAL
Science	268,274	211,240	38,115	517,629
Math	7,500	**	**	7,500
Engineering	90,502	61,683	39,678	191,863
TOTAL	366,276	272,923	77,793	716,992

* Veterinary Medicine and Agriculture Science are not included in KSU data. Medical Center is not included in KU data.

** KU and WSU math space included with science space.

Source: Institutional databases.

Grant Activity

Table 9 compares the level of federal R&D funds awarded to all universities and colleges in Kansas and its neighboring states. Kansas showed less change in funds received from 1983 to 1990 and in dollars received per capita than all states except Oklahoma. When compared to individual institutions, Kansas's institutions fare poorly for total and federal R&D funds awarded (Table 10). The comparison is even more unfavorable when peer institutions' R&D funds are examined. For example, when comparing Kansas University with the University of Colorado and University of Iowa, two of its peer institutions, its ranking for total dollars and federal dollars is much lower (Table 10). Kansas State University's ranking is also much lower than its peer institutions (Iowa State University and Colorado State University). These data emphasize that Kansas is not competing for its share R&D dollars.

Table 9**FEDERAL OBLIGATIONS TO UNIVERSITIES AND COLLEGES FOR RESEARCH AND DEVELOPMENT BY STATE**

State	1983 to 1990 (in thousands)	% Change	1990 Census (in thousands)	\$ Per Capita 1990
Colorado	83,570 - 168,905	102	3,294	51
Iowa	53,229 - 106,735	101	2,777	38
Missouri	86,389 - 169,883	97	5,117	33
Nebraska	14,714 - 29,379	100	1,578	19
Kansas	24,765 - 44,005	78	2,478	18
Oklahoma	21,429 - 35,866	67	3,146	11

Source NSF: Federal Support to Universities, Colleges and Non-Profit Institutions Fiscal Year 1990 (NSF 92-324; Table 8-11).

Grant activity (number and amount submitted) for science, engineering, and math faculty at Kansas State University, University of Kansas-Lawrence campus, and The Wichita State University was assessed. The overall dollars submitted to all funding sources increased for science and math in 1992 but dropped for engineering, resulting in no real change in 1992 over 1991 (Table 11). Amount of dollars requested from NSF for science, engineering, and math increased 42 percent. This increase may have been due, in part, to a 13 percent increase in the total number of grants submitted to NSF (see Appendix B for details).

Table 10

COMPARISON AMONG INSTITUTIONS FOR TOTAL AND
FEDERAL R&D FUNDS IN 1990 (in thousands)

Institution	Total \$* (rank)	Federal Obligation \$ (rank)	Engr \$*	Phys. Sci. \$*	Math/Comp Sci. \$*
U. of Colorado	154,723 (29)	142,413 (21)	20,660	21,438	4,198
Iowa State U.	115,945 (45)	58,104 (67)	29,974	5,396	8,314
U. of Iowa	115,778 (46)	93,991 (32)	9,707	17,498	1,745
U. of Nebraska	77,598 (71)	a	9,709	4,642	1,316
Colorado State U.	77,967 (78)	54,633 (71)	16,026	4,658	1,023
U. of Kansas	61,144 (92)	41,198 (91)	4,318	6,635	437
U. of Oklahoma	58,645 (95)	a	8,735	5,030	2,444
Kansas State U.	50,311 (101)	a	6,186	3,287	673
Wichita State U.	3,196 (253)	a	2,058	270	127

* Includes federal and non-federal dollars for S&E

a. Not in top 100

Source NSF: Academic Science/Engineering R&D Expenditures Fiscal Year 1989
(NSF 92-321).

An equivalent increase (13 percent) in the number of grants submitted to all funding sources did not result in a dramatic increase in dollars awarded. Table 12 shows that, for KU and WSU, the dollars awarded for science, engineering, and math from all funding sources increased by 5.3 percent. Without EPSCoR, there would have been almost no change (-0.03 percent). A substantial increase in funding for math research in 1992 resulted from increased NSF funding which included EPSCoR. While NSF funding at KSU, KU, and WSU for the sciences also increased, NSF funding for engineering decreased. The number of NSF grants funded at the three universities (Table 13) also increased slightly. Clearly, EPSCoR has had an impact on NSF funding levels. While the number of grants funded and the number of dollars awarded increased from 1991 to 1992, statements regarding changes in the state's competitiveness would be premature because of the brief time span being considered.

Table 11

GRANTS SUBMITTED: TOTAL DOLLARS: KSU, KU-LAWRENCE, WSU

ALL FUNDING SOURCES:		SUBMITTED:		
	1991	1992		% Change
Science	\$112,278,472	\$134,573,217		19.9%
Math	6,054,883	6,949,102		14.8%
Engineering	61,812,122	37,881,471		-38.7%
TOTAL	\$180,145,477	\$179,403,790		-0.4%
NSF ONLY:				
	1991	1992		% Change
Science	\$28,923,587	\$36,935,305		27.7%
Math	3,956,136	5,436,866		37.4%
Engineering	4,943,021	7,573,118		53.2%
TOTAL	\$35,110,446	\$49,945,289		42.3%

Source: Institutional databases.

Table 12

GRANTS AWARDED: TOTAL DOLLARS

ALL FUNDING SOURCES:		AWARDED:		
(KU-Lawrence and WSU only)	1991	1992		% Change
Science	\$30,479,050	\$30,682,529		0.7%
Math	482,807	1,027,371		100.1%
Engineering	4,917,911	6,053,745		23.1%
TOTAL	\$35,879,768	\$37,763,645		5.3%
WITHOUT NSF EPSCoR		\$34,783,645		-0.03%
NSF ONLY:				
(KSU, KU-Lawrence, and WSU)	1991	1992		% Change
Science	\$4,467,032	\$6,881,003		54.0%
Math	410,108	1,094,145		100.7%
Engineering	368,628	266,268		-27.8%
TOTAL	\$5,245,768	\$8,241,416		57.1%
WITHOUT NSF EPSCoR		\$6,761,416		28.9%

1992 NSF EPSCoR funding: \$1.48 million; \$1.5 million match from state of Kansas.

Source: Institutional databases.

Table 13

**NUMBER OF NSF GRANTS FUNDED
(KSU, KU-LAWRENCE, AND WSU)**

	1991		1992		% Change
	No.	% Funded	No.	% Funded	
Science	73	40.33%	81	38.57%	11.0%
Math	11	29/73%	17	38.64%	54.5%
Engineering	13	22.81%	7	12.28%	-46.2%
TOTAL	97	35.27%	105	33.76%	8.2%

Source: Institutional databases.

Table 14 shows that, based upon dollars requested, most grants written by KU and WSU faculty were submitted to federal agencies. Engineering faculty were more diverse and request more funding from nonfederal sources (state, private sector, other). See Appendix B for detailed tables for each institution.

Key Findings

It is premature to evaluate the impact that NSF EPSCoR has had upon the science, engineering, and math infrastructure at the three Ph.D. granting institutions in Kansas. Key findings regarding human resources and grant activity in science, engineering, and math include:

- * Faculty salaries remain low at 85 percent to 88 percent of those at peer institutions.
- * Only 15 percent of SEM faculty were women and 22 percent were minorities.
- * The 1992 fall graduate enrollment at KU-Lawrence and WSU showed no change over 1991 levels. Women made up 41 percent and minorities comprised 8 percent of graduate enrollment.

Table 14

DOLLARS SUBMITTED BY FUNDING SOURCE
(KU-LAWRENCE AND WSU)

GROUP AND SOURCE:	1991		1992	
	Amount Submitted	% of Total	Amount Submitted	% of Total
Science				
Federal	\$61,821,854	82%	\$69,216,935	81%
State	2,649,898	4%	4,069,525	5%
University	1,306,242	2%	1,440,259	2%
For Profit	3,954,164	5%	4,950,554	6%
Other	5,941,713	8%	5,803,270	7%
Math				
Federal	\$2,611,314	90%	\$2,231,494	99%
State	0	0%	13,562	1%
University	0	0%	0	0%
For Profit	161,938	6%	0	0%
Other	128,578	4%	0	0%
Engineering				
Federal	\$7,268,003	63%	\$9,817,436	64%
State	1,390,091	12%	1,290,712	8%
University	184,434	2%	267,275	2%
For Profit	1,267,879	11%	2,761,865	18%
Other	1,513,390	13%	1,244,671	8%
SEM TOTAL				
Federal	\$71,701,171	79%	\$81,265,865	79%
State	4,039,989	4%	5,373,799	5%
University	1,490,676	2%	1,707,534	2%
For Profit	5,383,981	6%	7,712,419	7%
Other	7,583,681	8%	7,047,941	7%

Source: Institutional databases.

- * Women earned 41 percent and minorities earned 9 percent of all SEM bachelor degrees. A smaller percentage earned graduate degrees (Ph.D.: females, 30 percent; minorities, 3 percent).
- * When compared to neighboring states and peer institutions, Kansas and its Ph.D. granting institutions are not receiving comparable levels of R&D funds.
- * EPSCoR had an impact on the level of NSF funding in Kansas. NSF funding increased by 57 percent from 1991 to 1992.
- * At KU-Lawrence and WSU, grants awarded to SEM faculty from all funding sources (NSF plus all others) only increased by 5 percent from 1991 to 1992.

These results suggest that attention must continue to focus upon the following:

1. Faculty salaries must be competitive with peer institutions.
2. Kansas needs to increase the participation of women and minorities in science, math, and engineering. The State must not only increase the number who enroll in graduate programs but must also increase the percentage that complete advanced degrees. The low number of women and minority students earning Ph.D.'s contributes to the difficulty in recruiting women and minority faculty.
3. The level of grants funded must continue to be monitored and steps taken to increase the size of the enterprise, both in terms of number of grants funded and in dollars awarded. Funding from all sources, NSF and other agencies, must increase if Kansas is to receive its fair share of federal funds.

FACULTY PERSPECTIVE

PROCEDURES

What are the barriers to research at the Ph.D granting universities in Kansas and what progress is being made to address or overcome these barriers in the past seven months? To answer these questions, science, engineering, and math (SEM) faculty at Kansas State University, the University of Kansas (Lawrence campus only), and The Wichita State University were asked to comment upon problems and improvements in the capacity to compete for federal funds. A random sample of 742 was drawn from the science, engineering, and math faculty, academic staff and administrators (Kansas State University = 269; University of Kansas = 313; and The Wichita State University = 160). A mail survey was sent to these faculty with a letter explaining its purpose (see Appendix C for a copy of the survey and a list of departments surveyed). Approximately one to two weeks after the survey was mailed, a phone call was made to those who had not returned the survey asking them to please complete it. The overall response rate was 55 percent (408 of 742 returned), with a return rate of 58 percent for KU, 55 percent for KSU, and 49 percent for WSU.

Those completing the survey had been at their university for an average of 13 years (range: 1 - 46 years). Other characteristics are presented in Table 15.

Table 15
DESCRIPTION OF SURVEY POPULATION

Nontenured faculty	26.2%
Tenured faculty	65.9%
Department chair	8.1%
University administrator	2.0%
Academic	5.6%
Professional	7.1%
Other	1.5%
Average age	47 yrs
Male	84%
Female	16%
Minority	9%

RESULTS

The results of the survey represent faculty perceptions and descriptions of conditions as they currently exist in grant development and support, the reward system, research equipment, facilities, technical support and services, personnel (faculty and graduate students), and barriers to research.

Extent of Grant Activity

A high percentage of science, engineering, and math (SEM) faculty reported submitting a grant proposal or contract to external funding sources in the last year. More faculty were submitting grants to external sources than to their university's research fund (Table 16). This is not surprising since the amount of university funding available is very small in comparison to amount available through external sources.

Table 16

**GRANT ACTIVITY:
PERCENTAGE OF FACULTY SUBMITTING PROPOSALS**

	External Source	University Research Fund *
KSU	72.3%	43.5%
KU	67.2%	40.6%
WSU	65.4%	36.4%
TOTAL	68.7%	40.8%

* Dollars available through university research funds is very small compared to external funds.

Sixty-one percent of faculty responding indicated that they contacted funding agencies at least once a year to find out about funding opportunities. Another 14 percent made contact every two years, and 25 percent had infrequent contact. These results indicate that a sizeable portion of the SEM faculty are actively pursuing external funding to support their research efforts, but a large number are not initiating contact with funding agencies with any regularity.

Reward System

The 1992 assessment of barriers to research stated that "rewards, especially raises, were inadequate to motivate the extra work funded research requires." To determine how grant activity was rewarded, faculty were asked to rate how grant submissions and awards are rewarded relative to other duties during the merit review process. Faculty indicated that funded grants rank second, just below publications in present reviews (Table 17), but that grants submitted are ranked next to last. As stated in the 1992 assessment, "departments reward the products of research, primarily publications, but not intervening efforts, such as proposal writing and grant submissions. Therefore, researchers who can produce results with little or no external funding rationally bypass grant seeking." The 1993 assessment indicated that faculty feel that submitting grants has a low rank during merit review. This perception of low reward for grants submitted may negate administrative directives that instruct faculty and staff to increase the number of grants submitted in order to increase the amount of external funding generated in their department or research unit. Grant submission efforts as well as the products of research (publications) must be recognized in some way to increase the number of submissions.

Table 17

**MERIT REVIEW AT THE DEPARTMENT LEVEL:
MEAN LEVEL OF IMPORTANCE (1 = MOST IMPORTANT)**

Rank	Total Group
1. Publications	1.7
2. Grants funded	2.5
3. Undergrad. teaching	3.2
4. Graduate teaching	3.3
5. Grants submitted	3.7
6. Service	4.6

Grant Development Support

As funding levels decrease, competition for grants increases. To be successful, universities should minimize the effort that individual researchers and departments expend on the routine aspects of grant writing. This keeps the rate of grant submissions and the frequency of success high. The 1992 assessment indicated that Kansas institutions need to

provide better grant development support. Seventy-five percent of SEM faculty who responded indicated that they receive some form of support or assistance during grant development (KSU, 83.6 percent; KU, 69.7 percent; WSU, 68.4 percent). Support for budget development, information, photocopying, and grant administration are services available to many, but not all, faculty (Table 18).

Table 18

PERCENTAGE OF FACULTY RECEIVING GRANT DEVELOPMENT SUPPORT

Rank	Type	Percentage
1.	Budget development	55.4%
2.	Information/networking (funding sources, etc.)	45.8%
3.	Photocopying	44.4%
4.	Grant administration	41.9%
5.	Word processing	37.3%
6.	Preparation of routine parts of grant application	26.5%
7.	Mentoring (help with planning/writing grant)	20.3%
8.	Other	4.7%

On a five-point scale (1 - superficial; 5 - comprehensive), the sufficiency or extent of grant development/administration support averaged 3.14 (S.D. 1.151) across all campuses. Efficiency of grant development/administration support was also measured (Table 19). While no significant differences existed among campuses in sufficiency of support, there was a significant difference in how faculty on different campuses viewed the efficiency of the support they received. Faculty at KU felt their grant development/administration support services were more efficient than did KSU and WSU faculty. Engineering faculty and science/math faculty also differed significantly in how they rated the sufficiency and efficiency of the support they received, with engineers receiving better services. When asked to describe the change in the level of grant development/administration support over the past five years, 59.8 percent said there was no change, 34 percent said it was increasing, and 6.3 percent said it was decreasing. These results suggest that there is still a need for improved grant development/administration support services, both in terms of the sufficiency and efficiency of that support. To ignore this need continues the cycle that causes "young researchers to give up and more senior researchers to give out."

Table 19

GRANT SUPPORT SERVICES

Group:	Sufficiency* Mean	Efficiency** Mean
TOTAL	3.1	3.5
KSU	3.1	3.4
KU	3.2	3.7
WSU	3.0	3.2
	$p \leq .4989$ (N.S.)	$p \leq .0017$
Engineering	3.4	3.8
Math/Science	3.1	3.4
	$p \leq .0254$	$p \leq .0109$

* 1 = superficial; 5 = comprehensive

** 1 = very inefficient; 5 = very efficient

Research Equipment

In 1992, new faculty reported inadequate start-up equipment; established faculty often reported lack of funds to repair, replace, and expand equipment. Agencies do not fund requests for equipment, which then traps faculty in the cycle of needing equipment to be competitive but not having funds to obtain and maintain equipment. In 1993, equipment continued to be an area of major concern.

Most (84 percent) science, engineering, and math faculty indicated that they require equipment to conduct their research. When asked to describe the equipment that is most critical to their research, 21 percent said it was not available due to lack of space, funds, support services, etc. or was old, obsolete, and unreliable. Another 33.6 percent said critical equipment was adequate but soon would be obsolete or inadequate. Thus, a total of 54.6 percent are either experiencing equipment problems or expect to in the near future (Table 20). Twenty-nine percent of the faculty reported that the state of their equipment hampered their ability to obtain grants, 45 percent said it neither prevented nor provided a competitive edge, and 26 percent reported it provided some degree of advantage or competitive edge.

Table 20**CONDITION OF EQUIPMENT**

Description:	Percentage:			
	Total	KSU	KU	WSU
Not available	7.4%	6.5%	4.3%	16.9%
Old, obsolete, unreliable	13.6%	16.1%	12.1%	11.9%
Adequate but soon obsolete/inadequate	33.6%	34.7%	34.0%	30.5%
Adequate	23.5%	25.0%	22.0%	23.7%
Competitive	15.7%	12.1%	19.1%	15.3%
State of the art	6.2%	5.6%	8.5%	1.7%

Faculty also reported that funding for equipment repair, replacement, and expansion is frequently unavailable. Continual assessment of and investment in equipment must remain a priority to improve those areas where condition of equipment impedes ability to obtain external funding and to replace equipment that will soon become obsolete or inadequate.

Sixty-one percent of the faculty reported having difficulty dealing with purchasing regulations. In 1992, faculty reported long delays in getting equipment and difficulty in getting the level of quality required for research. Thus, the equipment purchasing process apparently continues as a problem area. Further assessment of purchasing delays and difficulties is needed to determine how to improve the process.

Facilities

Engineering faculty's rating of the adequacy of facilities was significantly lower than math and science faculty (Table 21). Facilities were described as somewhat inadequate by engineers. Engineers reported that the facilities diminished their ability to obtain external grant funds.

Table 21

CONDITION OF FACILITIES

Group	Adequacy* Mean	Impact on Competitiveness** Mean
KSU	3.6	3.1
KU	3.1	3.1
WSU	2.9	2.8
	(N.S.)	(N.S.)
TOTAL	3.1	3.0
Engineers	2.8	2.7
Math/Science	3.1	3.1
	$p \leq .0021$	$p \leq .0001$

* 1 = not adequate; 5 = state of the art

** 1 = prevents getting external funds; 3 = neutral; 5 = provides competitive edge in obtaining funding

Technical Support and Services

Seventy percent of the faculty reported that they need some form of technical support and services to conduct research. In the 1992 assessment, faculty reported shortages in technical staff support to maintain current equipment and facilities. Science and engineering technical support and service facilities were also reported to be inadequate. In 1993, technical support and services continue to be a barrier. They are not always available to faculty who need it, nor does the quality of technical support and services always support cutting edge research (Table 22). Engineers were significantly more concerned with both the availability and adequacy of support and services. Types of technical support and service needed are listed in Appendix D.

Table 22

TECHNICAL SUPPORT AND SERVICES

Group	Availability* Mean	Adequacy** Mean
KSU	2.8	2.8
KU	3.2	3.1
WSU	2.7	2.6
	$p \leq .0057$	$p \leq .0103$
TOTAL	2.9	2.9
Engineers	2.5	2.4
Math/Science	3.0	3.0
	$p \leq .0022$	$p \leq .0002$

* 1 = not available; 5 = always available

** 1 = not adequate; 5 = supports cutting edge research

Personnel

Graduate Students. In 1992, faculty stressed that the foundation of successful research programs was graduate education, especially at the doctoral and postdoctoral level. In 1993, as in 1992, faculty at all three institutions reported having difficulty recruiting graduate students (Table 23). Perhaps because it is difficult to recruit graduate students, the quality of those who do come is reported to be average (Table 23). Again, the difficulties are perceived to be more acute in engineering.

The biggest barrier to recruiting graduate students is lack of funding and noncompetitive stipends and salaries (Table 24). The 1992 assessment identified lack of competitive support (low paying assistantships), lack of tuition reductions or waivers for graduate research assistants (RA), and lack of fellowships and teaching assistantships for beginning graduate students as major problems. These problems remain in 1993.³

³Tuition fees were recently waived for Graduate Teaching Assistants (GTAs), but similar fee waivers do not apply to Graduate Research Assistants (RAs).

Table 23

GRADUATE STUDENTS: AVAILABILITY AND QUALITY

	Ability to Recruit *	Quality of Recruits *
Group:	Mean	Mean
KSU	2.8	3.3
KU	3.2	3.5
WSU	3.0	3.2
	$p \leq .0155$	(N.S.)
TOTAL	3.0	3.4
Engineers	2.7	3.2
Math/Science	3.1	3.4
	$p \leq .0037$	$p \leq .0255$

* 1 = very poor; 5 = excellent

Table 24

BIGGEST BARRIER TO GRADUATE STUDENT RECRUITMENT

Rank	Percentage Responding
1. Lack of funding	55.1%
2. Noncompetitive salaries	43.4%
3. No fee waivers for RAs	29.9%
4. Departmental reputation	18.9%
5. Other	10.8%
6. Lack of industrial base in Kansas	7.1%

Faculty. While the current state of the economy may have helped reduce the difficulty facing universities recruiting high quality young faculty, the ability to recruit senior faculty who are excellent teachers and nationally recognized research scientists continues to be difficult (Table 25). These results suggest that the state has a potentially serious problem as it tries to build its SEM infrastructure. In order to compete for program projects, the type of grants increasingly favored by federal granting agencies, established faculty with national reputations are needed to provide the leadership to produce such large scale proposals that cross department/campus boundaries and include many investigators. In addition, the state will be at a serious disadvantage as it tries to recruit and/or retain nationally recognized faculty to build or strengthen an area of teaching and research. A major barrier to recruiting and retaining faculty with potential for or proven excellence in teaching and research is perceived to be salaries (Table 26).

Table 25

RECRUITMENT AND RETENTION OF NATIONALLY RECOGNIZED FACULTY

	Ability to Recruit *	Ability to Retain *
Group:	Mean	Mean
KSU	2.6	2.8
KU	3.2	3.3
WSU	2.5	2.6
	$p \leq .0000$	$p \leq .0000$
TOTAL	2.8	3.0
Engineers	2.2	2.6
Math/Science	3.0	3.1
	$p \leq .0000$	$p \leq .0003$

* 1 = poor; 5 = excellent

Table 26

BIGGEST BARRIER TO FACULTY RECRUITMENT AND RETENTION

Rank	Percentage Responding
1. Salaries	62.3%
2. Inadequate start-up packages for new faculty	37.0%
3. Teaching loads	22.5%
4. Inadequate facilities	21.8%
5. Inadequate support services	18.9%
6. Inadequate equipment	17.6%
7. Departmental reputation	16.7%
8. Other	11.3%
9. Overhead distribution policies	7.8%

Extent of Collaborative/Team Research

Seventy-eight percent of SEM faculty report that they are currently involved in collaborative/team research projects. Of those who do collaborative research, that collaboration most frequently occurs across departments (60.8 percent) and within departments (51.2 percent). Obviously, some faculty engage in both types: across and within departmental collaboration. Out-of-state collaboration (44.7 percent) occurs more frequently than collaboration across campuses within the state (24.4 percent), indicating common research interests rather than geographic proximity motivate collaboration. Further assessment would be needed to determine the extent to which collaboration involved or led to funded team research projects.

Barriers to Research

Faculty were asked to identify the biggest barrier to research productivity and external funding. Thirty-five percent of those responding identified problems relating to the degree of support given to the research mission as the biggest barrier to research productivity and external funding (Table 27). The type of comments grouped under this heading included lack of time, teaching load, undergraduate teaching emphasis, administrative barriers (lack of support or leadership, overall climate/focus), and the inability to reinvest overhead in the research enterprise (see Appendix E for detailed list of barriers). Infrastructure problems

(equipment, facilities, graduate students, technical support, etc.) were also frequently mentioned as the biggest barrier. Funding was also frequently mentioned as the biggest barrier to research. Limited funding and increased competition for extramural funds was a matter of great concern for many faculty.

Table 27

BARRIERS TO RESEARCH PRODUCTIVITY AND EXTERNAL FUNDING

Barrier	Percent of Faculty:			
	Total	KSU	KU	WSU
Degree of support for research mission	35.0%	31.0%	32.5%	46.0%
Infrastructure (physical, human)	26.0%	29.0%	25.0%	23.5%
Limited funding	18.0%	23.0%	19.0%	7.0%
Grant development/administration support	8.0%	2.5%	12.5%	7.0%
Incentives/reward system	5.0%	6.0%	5.5%	5.0%
Reputation for research	4.0%	2.5%	2.0%	9.0%
Other	4.0%	6.0%	4.0%	2.0%

Some faculty indicated concern regarding the balance between the educational mission and the research mission. However, when asked to describe the balance between the undergraduate education and graduate education mission within their department on a scale from one (undergraduate emphasis) to five (graduate emphasis), a fairly balanced picture emerged (mean for total group = 3.2; Table 28).

Significantly discernible but relatively small differences occurred between groups (Table 28). KSU faculty reported slightly more tendency to focus upon graduate education than did KU and WSU faculty. Engineering faculty were more likely to report a focus upon the undergraduate mission while science/math faculty reported more of an emphasis upon graduate education.

Faculty were also concerned with human resources. Faculty described a lack of critical mass of faculty, especially of research active faculty for collaboration, mentoring, etc. When asked to describe the number of faculty in their department on a scale from one (too few) to five (too many), the mean was 2.3 for all three institutions (Table 29). According to faculty perception, lack of critical mass is a problem at all three universities.

Table 28

DEPARTMENTAL UNDERGRADUATE AND GRADUATE EDUCATION EMPHASIS

Group:	Mean *
KSU	3.5
KU	3.1
WSU	2.9
	$p \leq .0000$
TOTAL	3.2
Engineers	2.8
Math/Science	3.4
	$p \leq .0000$

* 1 = undergraduate emphasis; 5 = graduate emphasis

Table 29

NUMBER OF FACULTY AT THE DEPARTMENT LEVEL

Group:	Mean *
KSU	2.5
KU	2.2
WSU	2.0
	$p \leq .0002$
TOTAL	2.3
Engineers	2.3
Math/Science	2.3
	(N.S.)

* 1 = too few; 5 = too many

Impact of EPSCoR

While many faculty (30 percent) reported EPSCoR has had no impact upon them, 12 percent reported getting equipment and/or technical support and eight percent reported getting graduate student and/or post doctoral support. Although EPSCoR has had an immediate impact through direct support for a limited number of faculty (9 percent of those surveyed received EPSCoR funds), it has had an impact upon the climate and morale of faculty that goes beyond this direct funding. Twenty-six percent of the SEM faculty said the EPSCoR was important in building collaboration and multi-disciplinary work. Such change is critical if the state is to move toward building research teams to compete for large program projects.

Key Findings

While some institutional changes are being made -- as described in the next section -- the results of the faculty survey indicate that major institutional changes affecting a large number of faculty either have not occurred in the past seven months or have not been in place long enough to have had an impact. The faculty survey indicated that:

- * Departments continue to reward the products of research, primarily publications, but not proposal writing and grant submissions. Therefore, researchers who can produce results with little or no external funding rationally bypass grant seeking.
- * In Kansas, there is still a need for improved grant development and administration support services. Successful grant recipients are persistent, and successful universities minimize the effort individual researchers must expend upon the routine aspects of grant writing so they do not give up or burn out.
- * Fifty-five percent of science, engineering, and math (SEM) faculty are experiencing equipment problems (lack of critical equipment or obsolete equipment) or expect to in the near future. In addition, funding for equipment repair, replacement, and expansion often is not available. Purchasing regulations continue to create difficulty for faculty.
- * Technical support and services continue to be a barrier. It is not always available.
- * Facilities are a problem, especially from the perspective of the engineering faculty.
- * Lack of funding, noncompetitive salaries, and a lack of tuition reductions or waivers for graduate research assistants make it difficult to recruit top quality graduate students. Because any improvement in SEM research and grant activity is grounded in improving graduate education, the state's ability to recruit top quality graduate students must be a priority.
- * Because of low salaries, recruitment of nationally recognized senior faculty continues to be a challenge.

- * In addition to providing funding for research, EPSCoR has had an impact upon the climate and morale of faculty. Faculty report that the EPSCoR process was important in building collaboration and multi-disciplinary work.

ADMINISTRATIVE PERSPECTIVE

PROCEDURES

To determine what institutional responses had been made to the 1992 assessment of barriers to research productivity and external funding, key administrators (Deans and upper level administrators) at each university were asked a series of questions to determine

1. How they view the level of research activity;
2. What has been done to increase the level of funded research;
3. What barriers to research productivity and funding exist and how are they being addressed;
4. Changes made in how the university invests in and rewards research and grant activity; and
5. Changes in the way the university attracts and retains research and grant productive faculty.

RESULTS

Level of Extramural Funding

Administrators agree that the level of funding is uneven; it varies from unit to unit. There is much excitement about the high quality of new faculty hires on all three campuses and the potential for research and grant activity that they represent. KSU is excited by various indicators of improvement in the overall research environment. Number of proposals submitted for extramural funding is up 50 percent from four years ago. WSU administrators agreed that research at WSU was improving, but there was less consensus as to the degree of improvement. KU administrators report that, while some new faculty are successful in obtaining grants, some senior faculty are losing funding and middle level faculty are giving up. WSU and KU administrators are very concerned about the increased competition for shrinking federal funds and the disproportionate impact that it has upon universities in Kansas.

Increasing Research Capacity

KSU reports more focus upon inter-disciplinary initiatives and cooperation among Colleges and Departments, which has led to more matching of grants and support of basic computer resources for inter-disciplinary efforts. Key administrators have also worked together to develop a more competitive and innovative recruitment program for new faculty, including more competitive start-up packages and competitive salaries. KSU reported making improvements in grant development and administration support services. Budget development assistance, guidelines clarification, searching for potential funding sources, and informing researchers of grant opportunities are a few of the Pre-Award Services office functions. Through the Office of Research and Sponsored Programs, faculty are provided feedback on proposals and workshops have also been set up on grant writing activities. The Institute for Social and Behavioral Research also provides services for social and behavioral scientists. The Agricultural Experiment Station is making available more seed money for competitive grant proposal development.

WSU has also made changes which have streamlined administration of grant funds and reporting mechanisms. A survey of faculty interest has contributed to better targeting of funding information to faculty. In addition, WSU is trying to fund a personal computer for every faculty member who wants one and has, during the past few years, improved services at the library and computer center to facilitate research activity. A new biology lab at WSU has also improved research capacity. The library's electronic data searches and on-line access to published research is helping to overcome some limitations inherent to WSU's size. In addition, recruitment and retention of strongly research oriented faculty has increased WSU's research capacity.

KU is working to get department chairs more focused on the need for grants and the need to form alliances across departments. As part of the recent internal review process, the Vice Chancellor of Research, Graduate Studies, and Public Service has sent a message that extramural funding is an institutional imperative. To support that message, a Research Development Fund has been set up to provide seed money for projects, including group/team projects. Funds will also serve to return overhead money to those who bring it in. A Bridging Fund/Start Up Fund will soon be available to help carry over faculty who are between grants and to enhance the universities start up packages.

Barriers to Research and Actions Taken

Kansas State University. Research administrators identified facilities, equipment, and personnel issues as the most significant barriers to research funding and productivity at the University. University infrastructure to support research (mainly equipment and facilities) is a major concern. Adequate library holdings, computer resources, animal care facilities, and research laboratory space are also a concern. The Advanced Manufacturing Institute (in Engineering), for example, is in a converted classroom. Other opportunities can simply not

develop because of lack of research space or care facilities.

The ability to recruit quality graduate students and to recruit and retain quality research faculty is also a concern. The primary limitation mentioned by the research administrators is funds for competitive salaries. Graduate stipends and faculty salaries are in many cases significantly below those of peer institutions. Such limited resources have also limited the number of graduate assistantships (e.g. in engineering).

Faculty also are constrained by heavy teaching loads (given overall inadequate state funding of Universities). Lack of state funding limits the number of technical support staff available to support research laboratories thus putting greater pressure on research faculty to perform technical repair and maintenance functions, rather than pursuing research funding opportunities.

The state's research equipment purchasing procedures are also a major barrier. State purchasing procedures generally create barriers to timely and efficient purchase of research equipment. State regulations should also be more open for recruitment of graduate students and faculty. One administrator also felt KSU needs a Washington presence to take advantage of new research initiatives/opportunities.

To address barriers, research facilities and technical support staff are now being used in an enhanced cooperative environment. The University is putting in place a capital improvements plan with enhancement of facilities for science and engineering as a priority. In some cases, such as in Engineering, classrooms have been converted to research laboratories to meet their basic space needs. A new Director of Central Computing should also enhance cooperative and coordinated computer resource development.

To deal with personnel issues, the Vice Provost for Research and Dean of the Graduate School has established a graduate fellowship program, so departments are more competitive in recruiting the highest quality graduate students. The state approved graduate teaching assistantship fee waiver has also helped create a more competitive recruitment environment. In several Colleges, Deans have used equity adjustments and position line consolidation to generate salary funds to enhance salaries of their most productive faculty.

The Office of Research and Sponsored Programs (along with support from the Institute for Social and Behavioral Research) has enhanced the availability of information on grant opportunities, enhanced the seed grant program, and streamlined the proposal preparation/approval process.

At the state level, K.S.U.'s active role in the new Science and Technology Board should increase the level of visibility of the University and its role in research and economic development in Kansas.

University of Kansas. The large undergraduate enrollment coupled with very tight budget conditions continues to create major challenges for administrators trying to fulfill the University's missions -- undergraduate education, graduate education, and research. Allocation of resources by the Office of Academic Affairs is driven by undergraduate enrollment. Departments experiencing increases in undergraduate enrollment are given funds for new faculty positions. Thus, the signal that undergraduate education is of primary importance is strongly felt throughout the University. The Office of Research, Graduate Studies, and Public Service has told the research units it supports that funded research is an institutional imperative. The final effect has been mixed signals from upper administration as one arm is driven by undergraduate education and the other is driven by research and graduate education. This situation creates tension between the teaching and research missions for those outside the central administration.

Deans are struggling with inadequate equipment and space. Equipment needs are acute in some areas. The need for more state support is critical to meet current equipment needs as well as equipment for new faculty start-up packages. The infrastructure needs of the sciences in the College of Liberal Arts and Sciences is especially acute. Lack of space for research is a serious problem in the Social Sciences and Engineering, and the facility housing the Physical Sciences is marginal and near the end of its useful life as regulatory standards (e.g., handling hazardous materials) continue to rise. This aging infrastructure coupled with rising regulatory standards are serious challenges facing the University.

Deans are committed to meeting both the undergraduate education mission and the graduate education/research mission of their schools. In addition to struggling with an aging infrastructure, they are trying to maintain the morale of research active faculty and trying to foster the growth and development of young faculty. They struggle to find resources to reward productive faculty and to invest in or seed promising projects. The Deans believe that good quality research also depends upon good quality graduate students. Graduate student recruitment remains a challenge because of inadequate funding.

To address these barriers, several steps have been taken. The Office of Research, Graduate Studies, and Public Service has sent a strong message to its research units that funded research is important. The new Research Development Fund will improve the University's ability to support pilot projects. A Bridging Fund/Start Up Fund will also improve internal funding of research programs. Efforts are being made to increase funds available for Graduate Fellowships. In addition, matching funds for research equipment are easier to obtain from the University. Finally, efforts have been made in some areas to return more overhead dollars to the research units generating the overhead in an effort to reward productivity.

The recent program review required by the Board of Regents increased attention to the importance of funded research by including research as part of the scale by which departments were evaluated. Some departments have done a good job putting together a long range plan for becoming more competitive and those plans are supported at the level of the

Dean with resources.

Within the University, there are models of success where an administrator placed external funding as a priority and rewarded it, thus increasing funding from \$400,000 to \$2 million in four years. However, for every success story there are other examples where faculty are giving up or beginning to panic because of the difficulty of getting extramural funding. Administrators hope that the high quality of recent new hires pays off in the near future. Because of the depressed economy, very talented new faculty are coming into the system. Administrators have emphasized the importance of obtaining extramural funding and These faculty will play an important role in the University's future research growth.

The Wichita State University. The most frequently mentioned barriers have to do with where WSU is in its growth and development cycle. There is still not the critical mass of faculty for research to truly flourish. Progress has been made and the mass is growing, but WSU still has a relatively small body of faculty actively involved in research. This leads to lack of adequate mentoring for young faculty. It strains ancillary resources. One interviewee described the situation in terms of a "lack of depth" of resources. This is an issue that takes time as much as anything and all seemed to feel the university is moving in the right direction.

Several administrative changes have been made during the past few years aimed at providing greater incentives for research. Teaching load policies have been clarified. There remains a sense among some that teaching loads are still relatively high, given expectations for research. Nevertheless the policy has been clarified, with the goal of providing lighter loads for those successfully engaged in research.

Annual evaluations of administrators are being implemented. Funded research is now one of the criteria considered in these evaluations.

The administrative change mentioned most favorably by interviewees is a plan to allocate a larger share of overhead funds back to the principle investigator, the department, and the college. The goal is to provide greater incentives to the principle investigator and his/her department and college. In addition, the change will provide more flexibility to recipients to use funds as they see fit. Flexible, or discretionary funds are often mentioned as a need. There is little or no funding for departments to pay travel for conferences or to use as seed money to give new ideas a boost.

Lack of state support in terms of funding is probably the biggest barrier the university faces at various levels. Funding for travel is a critical need often mentioned. Without visibility and personal knowledge of researchers, foundations are not likely to fund projects, no matter how good the proposals are.

A basic lack of support staff, from student assistance in the library, to support for equipment maintenance slows productivity of research faculty. For example, during the initial EPSCoR study it was suggested that help in photocopying of articles in the library would be a significant boost to productivity. Yet, when the minimum wage increased, the state provided no additional funding for student assistants, so the number of hours had to be cut back to accommodate the wage increase. There is simply not enough student assistant staff to provide the new service.

There remains a sense among WSU administrators that NSF has never been a very good target for WSU research expertise. WSU, with its strong emphasis on aviation and, increasingly, health care, has had more success with other national funding sources.

According to some administrators, a national move toward applied research, driven by the need to improve U.S. competitiveness, is underway. The move may be beneficial to WSU, with its tradition of working closely with local manufacturers and other businesses. There is currently a national debate emerging regarding the role of proprietary applied research and the effects it has on forwarding of the scholarly public body of knowledge. This debate, while not unique to WSU, will be played out at WSU, because of its strong mission of serving needs of local businesses.

Administrators often mention their frustration at the opportunity cost of funded research. If a faculty member's grant buys out teaching time, the university has to hire someone to teach those hours and there is no net gain to the university, in terms of resources. This is one of the reasons publication in scholarly journals is so highly valued. Publication in top journals is an important way for the funded research to actually pay off to the university's long-term well-being in terms of image and reputation as a contributor to the field of knowledge. The grant in and of itself does not do this as much as publication in top journals, according to the view of some administrators.

Administrators mentioned the poor image, and/or lack of visibility Kansas and WSU has among national foundations, which tend to focus on the nation's coasts. Anything that can be done to enhance the image of Kansas and WSU is helpful in competing for research grants.

Finally, WSU is going through major leadership changes. A new President will arrive in October. The Provost is leaving soon. An interim appointment has been made. The Dean of Liberal Arts and Science position is also currently held by an interim appointee.

Most people interviewed expressed a sense that improvements have been made in WSU's research capabilities. There is, however, a sense that WSU is moving upstream in a time of decreased funding available through national foundations. As the total pie shrinks, competition for limited funds intensifies. There seems to be a sense that WSU is poised to flourish. Major investments have been made in equipment and space. Many new, young, research oriented faculty have been hired. WSU seems to be at a point in its growth cycle

where even small boosts in funding here and there, (travel funds, for example) will have dramatic payoffs five years or so down the road. The barriers which remain are primarily associated with a lack of state funding for specific programs and staffing and a matter of where WSU is in its development cycle.

Investing In and Rewarding Research

Administrators were asked what, if any, changes had been made in the past year to invest in and reward research and grant activity. The changes at Kansas State University include more pooling of resources for enhancements in research equipment, innovative sharing of sponsored research overhead funds, more resources for productive faculty, greater emphasis on research in the merit process, and greater emphasis on recruiting faculty with capability of securing extramural funding. At the University of Kansas, similar emphasis on recruiting faculty with strong extramural funding potential has occurred. In addition, some new negotiation of how overhead is returned to research units or departments has resulted in more dollars returning to those who generate the grants to improve incentives. The recently created Research Development Fund will also serve as a way to invest in and develop new research projects. The change generating the most excitement at The Wichita State University is the plan to allocate a larger share of overhead funds back to the principle investigator, the department, and the college. While not yet implemented, the goal of such a plan would be to provide greater incentives to the principle investigator, his/her department, and college.

Key Findings

Interviews with key administrators at the three universities revealed an awareness of the serious barriers to research and grant activity. While administrators are using the limited resources they have to address these barriers, it is too early to determine whether their actions are having or will have a significant impact. Key findings from the interviews included:

- * Administrators believe the level of extramural funding is uneven; it varies across units.
- * Administrators on all three campuses felt that equipment, facilities, and personnel (e.g., ability to recruit graduate students) issues were serious barriers to research productivity.
- * Young faculty hired recently hold promise for developing funded research programs.
- * Efforts are being made to pool resources to stretch the limited resources as much as possible. This includes pooling resources for equipment, sharing or distributing overhead funds in new ways to reinvest in research, providing more resources (including salary adjustments) for productive faculty, creating seed funds and bridging funds, and improving grant development support services.

- * Large undergraduate enrollment and very tight budgets create much stress within the Universities to fulfill what they see as three essential but at times competing missions: undergraduate education, graduate education, and research. Funding is not adequate to support the infrastructure at levels needed to improve in all three areas. There is growing concern that the research mission cannot receive the support it needs to survive in an increasingly competitive extramural funding environment.

All three universities aspire to being research intensive universities, but this cannot be done at the expense of undergraduate teaching obligations. Some administrators felt the policies and circumstances that govern the freshman-sophomore experience must be addressed before the research and graduate education mission can receive the attention and resources it needs to flourish. Kansas must commit to rebuilding the aging infrastructure, especially equipment and, in some cases, facilities.

The newly formed Science and Technology Council of Kansas Inc. has an opportunity to work with the Board of Regents and the Legislature so they understand the role of research in institutions of higher education.

The Universities themselves need to resolve some of the pressure for resources among the undergraduate education, graduate education, and research missions. Universities aspire to be research intensive institutions because they know that the quality of education depends upon faculty who are involved in developing new knowledge. Many deans stated that the best teachers were also the best researchers. The undergraduate education challenges the Universities face are just as demanding as those faced in graduate education and research. Both challenges require a coordinated effort at all levels within each university and across the state's universities.

CONCLUSIONS

While it may be too early to expect large changes as a result of EPSCoR funding, the results of our assessment, conducted six months after Kansas became an EPSCoR state, indicate that some progress has been made toward addressing and removing barriers to research. Those faculty receiving direct EPSCoR funding have received equipment, technical support, and graduate student and postdoctoral funding. This funding has had an impact upon the research productivity and morale of funded faculty. In addition, the EPSCoR process has helped build state-wide collaboration and multi-disciplinary research groups.

KSU, KU, and WSU administrators are focusing upon barriers identified in the 1992 report. While administrators on all three campuses felt equipment, facilities, and personnel issues continued to be serious barriers to research, efforts are being made to pool resources and distribute overhead funds in ways that reinvest in research. Administrators continue to search for funds to provide salary adjustments for productive faculty, to create and increase seed funds and bridging funds, and to improve grant development support services.

Despite these efforts, the barriers that face Kansas' three universities remain largely unchanged. The universities and the state must:

- * Address the pressures on resources that large undergraduate enrollment and tight budgets create. It is difficult to improve the undergraduate education mission, the graduate education mission, and the research mission of the universities with inadequate resources. The infrastructure required to support these missions is inadequate, creating internal concern that the research mission cannot receive the support needed to survive in an increasingly competitive extramural funding environment. Graduate, especially doctoral, education must be strengthened to drive the research mission.
- * Make grant activity an institutional imperative. Administrative leadership at all levels should be sending a coordinated, consistent message regarding the importance of building areas and research teams competitive in national and international arenas.
- * Provide competitive salaries for graduate research assistants in order to improve the ability to recruit quality graduate students. Faculty salaries also need to be adjusted to competitive levels.
- * Improve technical support and services, equipment, and facilities.
- * Remove regulations that hamper purchase of research equipment.
- * Increase the participation of women and minorities in science, math, and engineering; and increase the number of women and minorities earning advanced degrees.

- * Improve grant development and administration support services to minimize the effort individual researchers must expend upon the routine aspects of grant writing.
- * Reward proposal writing and grant submissions as well as the products of research (publications) to stimulate grant activity.
- * Continue efforts to provide seed funds and bridging funds and use them to encourage proposal development and extramural funding.

Appendix A

INFRASTRUCTURE:

PERSONNEL, GRADUATE ENROLLMENT, DEGREES, AND FACILITIES

DEPARTMENTS/UNITS INCLUDED IN DATABASE

<p>KSU</p> <p><u>Science</u> Animal Science and Industry Entomology Plant Pathology Biochemistry Biology Chemistry Geology Physics Political Science Psychology Sociology/Anthro/Social Work Statistics Curriculum Foods and Nutrition Anatomy and Physiology Pathology/Microbiology</p> <p><u>Math</u></p> <p><u>Engineering</u> Agricultural Engineering Architectural Engineering Chemical Engineering Civil Engineering Electrical Engineering Industrial Engineering Mechanical Engineering</p> <p>KU (Lawrence Campus)</p> <p><u>Science</u> Academic Computing Animal Care Unit Anthropology Anthropology Museum Biological Sciences Biochemistry Botany Entomology Environmental Studies Physiol & Cell Biology Systematics & Ecology Biomedical Research Biological Survey</p>	<p>Bureau of Child Research Chemistry</p> <p>Child Development Lab Computer Science Ctr. Bioanalytical Research Ctr. Biomedical Research Ctr. Drug Delivery Economics Entomological Museum Experimental & Applied Ecology Geography Geology Gerontology Ctr. Herbarium Higuchi Biosciences Ctrs. Human Development Inst. Public Policy/Business Res. Interdisc. Environmental Studies Kansas Biological Survey Kansas Geological Survey Mass Spec Lab Medicinal Chemistry Microbiology Museum Natural History Museum Inv. Paleontology NMR Lab Paleontological Inst. Pharmacology and Toxicology Pharmaceutical Chemistry Pharmacy Practice Physics and Astronomy Psychology Science Instrument Lab Sociology</p> <p><u>Math</u></p> <p><u>Engineering</u> Aerospace Engineering Applied Remote Sensing Prog. Architectural Engineering CRINC Chemical & Petroleum Eng. Civil Engineering Electrical and Computer Engineering Engineering Management Mechanical Engineering</p>	<p>Space Technology Ctr. Tertiary Oil Recovery Project Transportation Research Ctr. Water Resources Institute</p> <p>WSU</p> <p><u>Science</u> Curriculum and Instruction Industrial Technology Communicative Disorders Biological Sciences Chemistry Geology Computer Science Physics Psychology Anthropology Clinical Sciences Health Admin & Gerontology Nursing Dental Hygiene Respiratory Therapy Medical Technology Gerontology Ctr. Physical Therapy Physician Assistant</p> <p><u>Math</u></p> <p><u>Engineering</u> Aerospace Engineering Electrical Engineering Industrial Engineering Mechanical Engineering Special Projects/Engineering Wind Tunnel/Engineering NIAR</p>
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SME FACULTY DEMOGRAPHICS FOR KSU, KU, AND WSU

SCIENCE	KSU	1991			1992			
		KU	WSU	TOTAL	KSU	KU	WSU	TOTAL
Male		241	86	327	288	242	83	613
Female		45	52	97	51	53	49	153
% Female		16%	38%	23%	15%	18%	37%	20%
White		262	123	385	301	270	116	687
African American		2	1	3	2	2	1	5
Hispanic		0	1	1	4	0	0	4
Asian/Pac.Isl.		22	13	245	29	22	15	66
Am.Ind/Alaskan		0	0	12	1	1	0	2
% Minority		8%	11%	40%	11%	8%	12%	10%

MATH	KSU	1991			1992			
		KU	WSU	TOTAL	KSU	KU	WSU	TOTAL
Male		34	26	60	31	35	26	92
Female		3	1	4	0	3	0	3
% Female		8%	4%	6%	0%	8%	0%	3%
White		32	20	52	23	32	19	74
African American		0	0	0	0	0	0	0
Hispanic		2	1	3	1	2	1	4
Asian/Pac.Isl.		3	6	245	7	4	6	17
Am.Ind/Alaskan		0	0	12	0	0	0	0
% Minority		14%	26%	83%	26%	16%	27%	22%

ENGINEERING	KSU	1991			1992			
		KU	WSU	TOTAL	KSU	KU	WSU	TOTAL
Male		74	42	116	104	74	44	222
Female		2	2	4	6	2	2	10
% Female		3%	5%	3%	5%	3%	4%	4%
White		66	34	100	95	64	34	193
African American		1	1	2	0	1	1	2
Hispanic		0	1	1	1	1	1	3
Asian/Pac.Isl.		9	8	245	16	10	10	36
Am.Ind/Alaskan		0	0	12	0	0	0	0
% Minority		13%	23%	72%	15%	16%	26%	18%

SCIENCE, MATH, & ENGINEERING	KSU	1991			1992			
		KU	WSU	TOTAL	KSU	KU	WSU	TOTAL
Male		349	154	503	423	351	153	927
Female		50	55	105	57	58	51	166
% Female		13%	26%	17%	12%	14%	25%	15%
White		360	177	537	419	366	169	954
African American		3	2	5	2	3	2	7
Hispanic		2	3	5	6	3	2	11
Asian/Pac.Isl.		34	27	245	52	36	31	245
Am.Ind/Alaskan		0	0	12	1	1	0	12
% Minority		10%	15%	33%	13%	11%	17%	22%

SME PERSONNEL BY TITLE FOR KSU, KU, AND WSU

ACADEMIC YEAR BEGINNING FALL OF

SCIENCE	1991				1992			
	KSU	KU	WSU	TOTAL	KSU	KU	WSU	TOTAL
Professor		158	29	187	166	154	30	350
Associate Prof.		68	41	109	80	72	40	192
Assistant Prof.		60	68	128	93	69	62	224
Academic Staff & Directors		111	20	131	64	125	12	201
Research Assoc/Assist.		133	2	135	138	152	1	291
Post Docs		45		45		57		57
Grad. Teaching Assist.		334	76	410	137	348	76	561
Student Research Assist.		365	1	366	243	427	8	678
Technical Staff **		56	18	74	15	56	23	94
TOTAL		1,330	255	1,585	936	1,460	252	2,648

MATH	1991				1992			
	KSU	KU	WSU	TOTAL	KSU	KU	WSU	TOTAL
Professor		17	5	22	11	17	6	34
Associate Prof.		14	14	28	8	14	12	34
Assistant Prof.		6	8	14	12	7	8	27
Academic Staff & Directors		1	12	13	2	2	12	16
Research Assoc/Assist.		0	0	0	0	0	0	0
Post Docs		0		0		0		0
Grad. Teaching Assist.		50	24	74	49	49	18	116
Student Research Assist.		0	0	0	0	0	0	0
Technical Staff		0	0	0	0	0	0	0
TOTAL		88	63	151	82	89	56	227

ENGINEERING ***	1991				1992			
	KSU	KU	WSU	TOTAL	KSU	KU	WSU	TOTAL
Professor		45	18	63	53	43	17	113
Associate Prof.		18	9	27	30	16	9	55
Assistant Prof.		13	17	30	27	17	20	64
Academic Staff & Directors		8	7	15	9	10	7	36
Research Assoc/Assist.		4	3	7	11	3	7	21
Post Docs		0		0		1		1
Grad. Teaching Assist.		43	69	112	3	44	35	82
Student Research Assist.		29	30	59	160	22	27	209
Technical Staff		11	13	24	1	10	13	24
TOTAL		171	166	337	304	166	135	605

SCIENCE, MATH, ENGINEERING	1991				1992			
	KSU	KU	WSU	TOTAL	KSU	KU	WSU	TOTAL
Professor		220	52	272	230	214	53	497
Associate Prof.		100	64	164	118	102	61	281
Assistant Prof.		79	93	172	132	93	90	315
Academic Staff & Directors		120	39	159	85	137	31	253
Research Assoc/Assist.		137	5	142	149	155	8	312
Post Docs		45		45		58	0	58
Grad. Teaching Assist.		427	169	596	189	441	129	759
Student Research Assist.		394	31	425	403	449	35	887
Technical Staff		67	31	98	16	66	36	118
TOTAL		1,589	484	2,073	1,322	1,715	443	3,480

* Lecturers and instructors are included under Academic Staff.

** WSU's Directors and Post Doctoral Fellows are included under Technical Staff.

*** WSU's Engineering data include the Natl. Inst. for Aviation Res.

SME PERSONNEL DEMOGRAPHICS FOR KSU, KU, AND WSU

ACADEMIC YEAR BEGINNING FALL OF

SCIENCE	KSU	1991			1992			TOTAL
		KU	WSU	TOTAL	KSU	KU	WSU	
Male		861	138	999	648	921	136	1,705
Female		469	117	586	288	539	116	943
% Female		35%	46%	37%	31%	37%	46%	36%
White		1,016	214	1,230	708	1,124	212	2,044
African American		25	2	27	15	30	2	47
Hispanic		32	1	33	17	23	1	41
Asian/Pac.Isl.		245	35	245	181	276	35	492
Am.Ind/Alaskan		12	3	12	4	7	2	13
% Minority		24%	16%	20%	23%	23%	16%	22%
MATH								
MATH	KSU	1991			1992			TOTAL
		KU	WSU	TOTAL	KSU	KU	WSU	
Male		64	51	115	68	65	47	180
Female		24	12	36	14	24	9	47
% Female		27%	19%	24%	17%	27%	16%	21%
White		66	47	113	54	66	43	163
African American		0	2	2	1	0	1	2
Hispanic		2	3	5	1	2	3	6
Asian/Pac.Isl.		19	11	245	26	19	9	54
Am.Ind/Alaskan		1	0	12	0	2	0	2
% Minority		25%	25%	70%	34%	26%	23%	28%
ENGINEERING								
ENGINEERING	KSU	1991			1992			TOTAL
		KU	WSU	TOTAL	KSU	KU	WSU	
Male		156	147	303	276	149	121	546
Female		17	19	36	28	17	14	59
% Female		10%	11%	11%	9%	10%	10%	10%
White		128	98	226	171	121	81	373
African American		6	2	8	1	9	2	12
Hispanic		3	4	7	2	2	1	5
Asian/Pac.Isl.		35	50	245	131	34	42	207
Am.Ind/Alaskan		1	12	12	1	0	9	10
% Minority		26%	41%	55%	44%	27%	40%	39%
SCIENCE, MATH, ENGINEERING								
SCIENCE, MATH, ENGINEERING	KSU	1991			1992			TOTAL
		KU	WSU	TOTAL	KSU	KU	WSU	
Male		1,081	336	1,417	992	1,135	304	2,431
Female		510	148	658	330	580	139	1,049
% Female		32%	31%	32%	25%	34%	31%	30%
White		1,210	359	1,569	933	1,311	336	2,580
African American		31	6	37	17	39	5	61
Hispanic		37	8	45	20	27	5	52
Asian/Pac.Isl.		299	96	245	338	329	86	245
Am.Ind/Alaskan		14	15	12	5	9	11	12
% Minority		24%	26%	18%	29%	24%	24%	13%

SME GRADUATE ENROLLMENT DEMOGRAPHICS FOR KSU, KU, AND WSU

SCIENCE	KSU *	1991			TOTAL	KSU	1992		
		KU *	WSU *	TOTAL			KU	WSU	TOTAL
Male		631	172	803		647	157	804	
Female		464	522	986		514	484	998	
TOTAL		1,095	694	1,789		1,161	641	1,802	
% Female		42%	75%	55%		44%	76%	55%	
White		561	609	1,170		572	545	1,117	
African American		12	17	29		12	24	36	
Hispanic		13	9	22		17	12	29	
Asian/Pac.Isl.		17	3	20		20	9	29	
Am.Ind./Alaskan		1	9	10		2	3	5	
Nonresident Alien		336	47	383		336	48	384	
Not Reported		155		155		202		202	
% Minority **		7%	6%	6%		8%	8%	8%	

MATH	KSU	1991			TOTAL	KSU	1992		
		KU	WSU	TOTAL			KU	WSU	TOTAL
Male		32	29	61		39	26	65	
Female		22	11	33		22	16	38	
TOTAL		54	40	94		61	42	103	
% Female		41%	28%	35%		36%	38%	37%	
White		26	13	39		27	22	49	
African American		0	0	0		0	0	0	
Hispanic		0	0	0		0	0	0	
Asian/Pac.Isl.		1	1	2		2	0	2	
Am.Ind./Alaskan		1	0	1		2	0	2	
Nonresident Alien		22	26	48		24	20	44	
Not Reporting		4		4		6		6	
% Minority		7%	7%	7%		13%	0%	8%	

ENGINEERING	KSU	1991			TOTAL	KSU	1992		
		KU	WSU	TOTAL			KU	WSU	TOTAL
Male		478	240	718		517	255	772	
Female		75	26	101		80	30	110	
TOTAL		553	266	819		597	285	882	
% Female		14%	10%	12%		13%	11%	12%	
White		314	112	426		314	118	432	
African American		1	3	4		3	4	7	
Hispanic		3	2	5		4	3	7	
Asian/Pac.Isl.		14	9	23		12	9	21	
Am.Ind./Alaskan		1	1	2		1	1	2	
Nonresident Alien		160	139	299		190	150	340	
Not Reporting		60		60		73		73	
% Minority		6%	12%	7%		6%	13%	8%	

SCIENCE, MATH, ENGINEERING	KSU	1991			KSU	1992		
		KU	WSU	TOTAL		KU	WSU	TOTAL
Male		1,141	441	1,582		1,203	438	1,641
Female		561	559	1,120		616	530	1,146
TOTAL		1,702	1,000	2,702		1,819	968	2,787
% Female		33%	56%	41%		34%	55%	41%
White		901	734	1,635		913	685	1,598
African American		13	20	33		15	28	43
Hispanic		16	11	27		21	15	36
Asian/Pac.Isl.		32	13	45		34	18	52
Am.Ind/Alaskan		3	10	13		5	4	9
Nonresident Alien		518	212	730		550	218	768
Not Reporting		219	0	219		281	0	281
% Minority		7%	7%	7%		8%	9%	8%

* KSU data not available. KU data are by fiscal year; WSU data are by academic year.

** Formula used: African American+Hispanic+Asian/Pacific Islander+ American Indian/Alaskan Native divided by White+African American+Hispanic+Asian/Pacific Islander+American Indian/Alaskan Native

SME Ph.D. DEGREES FOR KSU, KU, AND WSU

SCIENCE	KSU	1991			TOTAL	KSU	1992			TOTAL
		KU *	WSU *				KU	WSU		
Male		53	4		57	53	56	3		112
Female		23	1		24	26	33	2		61
TOTAL		76	5		81	79	89	5		173
% Female		30%	20%		30%	33%	37%	40%		35%
Caucasian		59	5		64		60	4		64
African American		1	0		1		1	0		1
Hispanic		0	0		0		0	0		0
Asian/Pac.Isl.		0	0		0		0	0		0
Am.Ind/Alaskan		0	0		0		0	0		0
Nonresident Alien		16	0		16		27	1		28
Not Reported		0			0		1			1
% Minority **		2%	0%		2%		2%	0%		2%

MATH	KSU	1991			TOTAL	KSU	1992			TOTAL
		KU	WSU				KU	WSU		
Male		1	0		1	2	5	1		8
Female		0	0		0	1	0	0		1
TOTAL		1	0		1	3	5	1		9
% Female		0%	0%		0%	33%	0%	0%		11%
Caucasian		1	0		1		3	1		4
African American		0	0		0		0	0		0
Hispanic		0	0		0		0	0		0
Asian/Pac.Isl.		0	0		0		0	0		0
Am.Ind/Alaskan		0	0		0		0	0		0
Nonresident Alien		0	0		0		2	0		2
Not Reporting		0			0		0			0
% Minority		0%	0%		0%		0%	0%		0%

ENGINEERING	KSU	1991			TOTAL	KSU	1992			TOTAL
		KU	WSU				KU	WSU		
Male		16	3		19	10	18	5		33
Female		0	1		1	2	0	2		4
TOTAL		16	4		20	12	18	7		37
% Female		0%	25%		5%	17%	0%	29%		11%
Caucasian		8	2		10		7	1		8
African American		0	0		0		0	0		0
Hispanic		0	0		0		0	0		0
Asian/Pac.Isl.		0	0		0		1	0		1
Am.Ind/Alaskan		0	0		0		0	0		0
Nonresident Alien		8	2		10		2	6		8
Not Reporting		0			0		0			0
% Minority		0%	0%		0%		13%	0%		11%

SCIENCE, MATH, & ENGINEERING	KSU	1991			KSU	1992		
		KU	WSU	TOTAL		KU	WSU	TOTAL
Male		70	7	77	65	79	9	153
Female		23	2	25	29	33	4	66
TOTAL		93	9	102	94	112	13	219
% Female		25%	22%	25%	31%	29%	31%	30%
Caucasian		68	7	75		70	6	76
African American		1	0	1	1	0		1
Hispanic		0	0	0	0	0		0
Asian/Pac.Isl.		0	0	0	1	0		1
Am.Ind./Alaskan		0	0	0	0	0		0
Nonresident Alien		24	2	26	31	7		38
Not Reporting		0	0	0	1	0		1
% Minority		1%	0%	1%	3%	0%		3%

* KSU and KU data are by fiscal year; WSU data are by academic year.

** Formula used: African American+Hispanic+Asian/Pacific Islander+ American Indian/Alaskan Native divided by White+African American+Hispanic+Asian/Pacific Islander+American Indian/Alaskan Native

SME MASTERS DEGREES FOR KSU, KU, AND WSU

SCIENCE	KSU	1991			TOTAL	KSU	1992		TOTAL
		KU *	WSU *	KSU			KU	WSU	
Male		65	18	83	43	84	26	153	
Female		64	73	137	29	59	52	140	
TOTAL		129	91	220	72	143	78	293	
% Female		50%	80%	62%	40%	41%	67%	48%	
Caucasian		66	85	151		85	62	147	
African American		1	0	1		2	3	5	
Hispanic		0	1	1		1	1	2	
Asian/Pac.Isl.		2	0	2		0	1	1	
Am.Ind/Alaskan		1	0	1		0	0	0	
Nonresident Alien		47	5	52		41	11	52	
Not Reported		12		12		14		14	
% Minority **		6%	1%	3%		3%	7%	5%	

MATH	KSU	1991			TOTAL	KSU	1992		TOTAL
		KU	WSU	KSU			KU	WSU	
Male		6	1	7	6	9	2	17	
Female		6	0	6	1	5	0	6	
TOTAL		12	1	13	7	14	2	23	
% Female		50%	0%	46%	14%	36%	0%	26%	
Caucasian		7	0	7		5	2	7	
African American		0	0	0		0	0	0	
Hispanic		0	0	0		0	0	0	
Asian/Pac.Isl.		0	0	0		0	0	0	
Am.Ind/Alaskan		0	0	0		0	0	0	
Nonresident Alien		5	1	6		8	0	8	
Not Reporting		0		0		1		1	
% Minority		0%	0%	0%		0%	0%	0%	

ENGINEERING	KSU	1991			TOTAL	KSU	1992		TOTAL
		KU	WSU	KSU			KU	WSU	
Male		87	47	134	59	95	45	199	
Female		7	6	13	4	17	3	24	
TOTAL		94	53	147	63	112	48	223	
% Female		7%	11%	9%	6%	15%	6%	11%	
Caucasian		51	20	71		79	22	101	
African American		0	0	0		0	0	0	
Hispanic		3	0	3		1	1	2	
Asian/Pac.Isl.		3	3	6		0	2	2	
Am.Ind/Alaskan		0	0	0		0	0	0	
Nonresident Alien		36	30	66		31	23	54	
Not Reporting		1		1		1		1	
% Minority		11%	13%	11%		1%	12%	4%	

SCIENCE, MATH, & ENGINEERING	KSU	1991			KSU	1992		
		KU	WSU	TOTAL		KU	WSU	TOTAL
Male		158	66	224	108	188	73	369
Female		77	79	156	34	81	55	170
TOTAL		235	145	380	142	269	128	539
% Female		33%	54%	41%	24%	30%	43%	32%
Caucasian		124	105	229	169	86	255	
African American		1	0	1	2	3	5	
Hispanic		3	1	4	2	2	4	
Asian/Pac.Isl.		5	3	8	0	3	3	
Am.Ind/Alaskan		1	0	1	0	0	0	
Nonresident Alien		88	36	124	80	34	114	
Not Reporting		13	0	13	16	0	16	
% Minority		7%	4%	6%	2%	9%	4%	

* KSU and KU data are by fiscal year; WSU data are by academic year.

** Formula used: African American+Hispanic+Asian/Pacific Islander+ American Indian/Alaskan Native divided by White+African American+Hispanic+Asian/Pacific Islander+American Indian/Alaskan Native

SME BACHELOR DEGREES FOR KSU, KU, AND WSU

SCIENCE	KSU	1991			TOTAL	1992			TOTAL
		KU*	WSU*	KSU		KU	WSU		
Male		435	109	544	208	521	131	860	
Female		459	312	771	201	516	325	1042	
TOTAL		894	421	1,315	409	1,037	456	1,902	
% Female		51%	74%	59%	49%	50%	71%	55%	
Caucasian		785	373	1,158		872	401	1,273	
African American		12	11	23		18	9	27	
Hispanic		11	16	27		19	6	25	
Asian/Pac.Isl.		24	6	30		32	10	42	
Am.Ind/Alaskan		2	3	5		4	5	9	
Nonresident Alien		42	12	54		65	25	90	
Not Reported		18		18		27		27	
% Minority **		6%	9%	7%		8%	7%	7%	

MATH	KSU	1991			TOTAL	1992			TOTAL
		KU	WSU	KSU		KU	WSU		
Male		21	6	27	12	16	10	38	
Female		12	8	20	7	10	4	21	
TOTAL		33	14	47	19	26	14	59	
% Female		36%	57%	43%	37%	38%	29%	36%	
Caucasian		26	14	40		23	12	35	
African American		1	0	1		1	0	1	
Hispanic		0	0	0		0	1	1	
Asian/Pac.Isl.		1	0	1		0	1	1	
Am.Ind/Alaskan		0	0	0		0	0	0	
Nonresident Alien		5	0	5		2	0	2	
Not Reporting		0		0		0		0	
% Minority		7%	0%	5%		4%	14%	8%	

ENGINEERING	KSU	1991			TOTAL	1992			TOTAL
		KU	WSU	KSU		KU	WSU		
Male		249	128	377	319	202	255	776	
Female		34	15	49	48	37	30	115	
TOTAL		283	143	426	367	239	285	891	
% Female		12%	10%	12%	13%	15%	11%	13%	
Caucasian		201	73	274		170	60	230	
African American		4	1	5		3	1	4	
Hispanic		3	2	5		3	3	6	
Asian/Pac.Isl.		14	17	31		14	18	32	
Am.Ind/Alaskan		0	0	0		1	2	3	
Nonresident Alien		50	50	100		45	47	92	
Not Reporting		11		11		3		3	
% Minority		9%	22%	13%		11%	29%	16%	

SCIENCE, MATH, & ENGINEERING	1991				1992			
	KSU	KU	WSU	TOTAL	KSU	KU	WSU	TOTAL
Male		705	243	948	539	739	396	1,674
Female		505	335	840	256	563	359	1,178
TOTAL		1,210	578	1,788	795	1,302	755	2,852
% Female		42%	58%	47%	32%	43%	48%	41%
Caucasian		1,012	460	1,472	1,065	473		1,538
African American		17	12	29	22	10		32
Hispanic		14	18	32	22	10		32
Asian/Pac.Isl.		39	23	62	46	29		75
Am.Ind/Alaskan		2	3	5	5	7		12
Nonresident Alien		97	62	159	112	72		184
Not Reporting		29	0	29	30	0		30
% Minority		7%	11%	8%	8%	11%		9%

* KSU and KU data are by fiscal year; WSU data are by academic year.

** Formula used: African American+Hispanic+Asian/Pacific Islander+ American Indian/Alaskan Native divided by White+African American+Hispanic+Asian/Pacific Islander+American Indian/Alaskan Native

AVAILABLE FACILITIES (SQUARE FEET) FOR SCIENCE, MATH, AND ENGINEERING BY ACADEMIC YEAR ***

	KSU	1991			TOTAL	KSU *	1992		TOTAL
		KU *	WSU				KU	WSU	
SCIENCE									
Nonclass lab area		206,666	34,211	240,877	268,274	211,240	35,882	515,396	
Greenhouses and animal space			2,233	2,233			2,233	2,233	
TOTAL		206,666	36,444	243,110	268,274	211,240	38,115	517,629	
	KSU	1991			TOTAL	KSU	1992		TOTAL
		KU **	WSU				KU	WSU	
MATH									
Nonclass lab area		**	0	0	7,500			7,500	
	KSU	1991			TOTAL	KSU	1992		TOTAL
		KU	WSU				KU	WSU	
ENGINEERING									
Nonclass lab area		61,683	39,678	101,361	90,502	61,683	39,678	191,863	
	KSU	1991			TOTAL	KSU **	1992		TOTAL
		KU **	WSU				KU	WSU	
SCIENCE, MATH, & ENGINEERING									
Nonclass lab area		268,349	73,889	342,238	366,276	272,923	75,560	714,759	
Greenhouses and animal space			2,233	2,233			2,233	2,233	
TOTAL		268,349	76,122	344,471	366,276	272,923	77,793	716,992	

* Nonclass lab area and greenhouse/animal space are combined for KSU and KU.

** KU and WSU math space included with Science totals.

*** KSU Science data does not include Medical Sciences (Vet. Med.) or Agriculture Sciences. KU Science data does not include the Medical Center. WSU engineering data includes the National Institute for Aviation Research space.

Appendix B
GRANT ACTIVITY

TOTAL GRANTS: 1991

SCIENCE	NUMBER			TOTAL NUMBER	KSU	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU			KU	WSU		
Awarded	*	359	28	387	*	\$29,695,223	\$783,827	\$30,479,050	
Rejected		206	NA	206		\$26,916,753	NA	\$26,916,753	
Pending		26	NA	26		\$2,031,827	NA	\$2,031,827	
Total									
Submitted	231	591	62	884	\$36,604,601	\$63,908,659	\$11,765,212	\$112,278,472	
% Funded		60.74%	45.16%			46.47%	6.66%		

MATH	NUMBER			TOTAL NUMBER	KSU	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU			KU	WSU		
Awarded	*	6	4	10	*	\$266,509	\$216,298	\$482,807	
Rejected		13	0	13		\$1,287,543	NA	\$1,287,543	
Pending		0	0	0		\$0	NA	\$0	
Total									
Submitted	30	19	10	59	\$3,153,053	\$2,196,041	\$705,789	\$6,054,883	
% Funded		31.58%	40.00%			12.14%	30.65%		

ENGIN	NUMBER			TOTAL NUMBER	KSU	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU			KU	WSU		
Awarded	*	105	25	130	*	\$3,889,737	\$1,028,174	\$4,917,911	
Rejected		61	NA	61		\$4,104,292	NA	\$4,104,292	
Pending		1	NA	1		\$57,876	NA	\$57,876	
Total									
Submitted	133	167	37	337	\$50,188,325	\$8,789,340	\$2,834,457	\$61,812,122	
% Funded		62.87%	67.57%			44.26%	36.27%		

SME Tot	NUMBER			TOTAL NUMBER	KSU	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU			KU	WSU		
Awarded	*	470	57	527	*	\$33,851,469	\$2,028,299	\$35,879,768	
Rejected		280	0	280		\$32,308,588	\$0	\$32,308,588	
Pending		27	0	27		\$2,089,703	\$0	\$2,089,703	
Total									
Submitted	394	777	109	1,280	\$89,945,979	\$74,894,040	\$15,305,458	\$180,145,477	
% Funded		60.49%	52.29%			45.20%	13.25%		

* KSU data not available.

TOTAL GRANTS: 1992

SCIENCE	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	*	364	27	391	*	\$29,852,279	\$830,250	\$30,682,529
Rejected		127	NA	127		\$23,450,235	NA	\$23,450,235
Pending		156	NA	156		\$17,315,251	NA	\$17,315,251
Total								
Submitted	248	647	69	674	\$49,092,674	\$77,000,512	\$8,480,031	\$134,573,217
% Funded		56.26%	39.13%			38.77%	9.79%	

MATH	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	*	9	6	15	*	\$752,513	\$274,858	\$1,027,371
Rejected		7	NA	7		\$589,990	NA	\$589,990
Pending		2	NA	2		\$172,219	NA	\$172,219
Total								
Submitted	38	18	12	24	\$4,704,046	\$1,461,698	\$783,358	\$6,949,102
% Funded		50.00%	50.00%			51.48%	35.09%	

ENGIN	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	*	104	16	120	*	\$5,349,065	\$704,680	\$6,053,745
Rejected		34	NA	34		\$2,809,996	NA	\$2,809,996
Pending		19	NA	19		\$2,478,444	NA	\$2,478,444
Total								
Submitted	217	157	45	173	\$22,499,512	\$10,643,030	\$4,738,929	\$37,881,471
% Funded		66.24%	35.56%			50.26%	14.87%	

SME Tot	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	*	477	49	526	*	\$35,953,857	\$1,809,788	\$37,763,645
Rejected		168	0	168		\$26,850,221	\$0	\$26,850,221
Pending		177	0	177		\$19,965,914	\$0	\$19,965,914
Total								
Submitted	503	822	126	871	\$76,296,232	\$89,105,240	\$14,002,318	\$179,403,790
% Funded		58.03%	38.89%			40.35%	12.92%	

*KSU data not available.

NSF GRANTS: 1991

SCIENCE	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	30	42	1	73	\$2,016,357	\$2,391,019	\$59,656	\$4,467,032
Rejected	41	55	6	102	\$7,746,799	\$9,758,150	\$1,051,978	\$18,556,927
Pending	0	2	4	6	\$0	\$447,930	\$3,381,389	\$3,829,319
Total								
Submitted	71	99	11	181	\$9,763,156	\$14,667,408	\$4,493,023	\$28,923,587
% Funded	42.25%	42.42%	9.09%	40.33%	20.65%	16.30%	1.33%	15.44%

MATH	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	3	6	2	11	\$76,845	\$266,509	\$66,754	\$410,108
Rejected	13	10	2	25	\$1,708,067	\$1,106,845	\$76,133	\$2,891,045
Pending	0	0	1	1	\$0	\$0	\$12,994	\$12,994
Total								
Submitted	16	16	5	37	\$1,784,912	\$2,015,343	\$155,881	\$3,956,136
% Funded	18.75%	37.50%	40.00%	29.73%	4.31%	13.22%	42.82%	1037%

ENGIN	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	4	9	0	13	\$103,901	\$264,727	\$0	\$368,628
Rejected	21	16	5	42	\$1,733,744	\$1,717,203	\$244,081	\$3,695,028
Pending	0	0	2	2	\$0	\$0	\$879,365	\$879,365
Total								
Submitted	25	25	7	57	\$1,837,645	\$2,387,355	\$1,123,446	\$4,943,021
% Funded	16.00%	36.00%	0.00%	22.81%	5.65%	11.09%	0.00%	7.46%

SME Tot	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	37	57	3	97	\$2,197,103	\$2,922,255	\$126,410	\$5,245,768
Rejected	75	81	13	169	\$11,188,610	\$12,582,198	\$1,372,192	\$25,143,000
Pending	0	2	7	9	\$0	\$447,930	\$4,273,748	\$4,721,678
Total								
Submitted	112	140	23	275	\$13,385,713	\$19,070,106	\$5,772,350	\$35,110,446
% Funded	0.77%	40.71%	13.04%	35.27%	16.41%	15.32%	2.19%	1494%

NSF GRANTS: 1992

SCIENCE	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	34	44	3	81	\$3,872,123	\$2,910,476	\$98,404	\$6,881,003
Rejected	41	54	5	100	\$7,777,945	\$12,858,653	\$2,033,026	\$22,669,624
Pending	7	13	9	29	\$1,097,766	\$5,201,539	\$1,085,373	\$7,384,678
Total								
Submitted	82	111	17	210	\$12,747,834	\$20,970,668	\$3,216,803	\$36,935,305
% Funded	41.46%	39.64%	17.65%	38.57%	30.37%	11.94%	3.06%	18.63%

MATH	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	5	7	5	17	\$135,134	\$719,799	\$239,212	\$1,094,145
Rejected	11	7	4	22	\$2,874,337	\$589,990	\$170,145	\$3,634,472
Pending	4	1	0	5	\$619,469	\$154,045	\$0	\$773,514
Total								
Submitted	20	15	9	44	\$3,628,940	\$1,398,569	\$409,357	\$5,436,866
% Funded	25.00%	46.67%	55.56%	38.64%	3.72%	51.47%	58.44%	20.12%

ENGIN	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT
	KSU	KU	WSU		KSU	KU	WSU	
Awarded	3	2	2	7	\$102,911	\$19,710	\$143,647	\$266,268
Rejected	22	6	0	28	\$3,562,496	\$596,184	\$0	\$4,158,680
Pending	5	6	11	226	\$1,003,298	\$1,265,000	\$874,695	\$3,142,993
Total								
Submitted	30	14	13	57	\$4,668,705	\$1,886,071	\$1,018,342	\$7,573,118
% Funded	10.00%	14.29%	15.38%	12.28%	2.20%	1.05%	14.11%	3.52%

SME Tot	NUMBER			TOTAL NUMBER	AMOUNT			TOTAL AMOUNT	
	KSU	KU	WSU		KSU	KU	WSU		
Awarded	42	53	10	105	\$4,110,168	\$3,649,985	\$481,263	\$8,241,416	
Rejected	74	67	9	150	\$14,214,778	\$14,044,827	\$2,203,171	\$30,462,776	
Pending	16	20	20	56	\$2,720,533	\$6,620,584	\$1,960,068	\$11,301,185	
Total									
Submitted	132	140	39	311	\$21,045,479	\$24,255,308	\$4,644,502	\$49,945,289	
% Funded	31.82%	37.86%	25.64%	33.76%	0.36	3028123	13.20%	10.36%	15.45%

ALL GRANT ACTIVITY BY FUNDING SOURCE: 1991

GROUP and AMOUNT SUBMITTED:

SOURCE:	KSU	KU	WSU	TOTAL AMOUNT SUBMITTED	% of TOTAL
SCIENCE					
Federal	*	\$51,551,827	\$10,270,027	\$61,821,854	82%
State		\$2,550,098	\$99,800	\$2,649,898	4%
University		\$1,306,242	\$0	\$1,306,242	2%
For Profit		\$3,871,192	\$82,972	\$3,954,164	5%
Other		\$4,629,300	\$1,312,413	\$5,941,713	8%
Subtotal		\$63,908,659	\$11,765,212	\$75,673,871	
MATH					
Federal	*	\$2,034,103	\$577,211	\$2,611,314	90%
State		\$0	\$0	\$0	0%
University		\$0	\$0	\$0	0%
For Profit		\$161,938	\$0	\$161,938	6%
Other		\$0	\$128,578	\$128,578	4%
Subtotal		\$2,196,041	\$705,789	\$2,901,830	
ENGINEERING					
Federal	*	\$5,684,750	\$1,583,253	\$7,268,003	63%
State		\$1,381,964	\$8,127	\$1,390,091	12%
University		\$184,434	\$0	\$184,434	2%
For Profit		\$785,088	\$482,791	\$1,267,879	11%
Other		\$753,104	\$760,286	\$1,513,390	13%
Subtotal		\$8,789,340	\$2,834,457	\$11,623,797	
SME TOTAL					
Federal	*	\$59,270,680	\$12,430,491	\$71,701,171	79%
State		\$3,932,062	\$107,927	\$4,039,989	4%
University		\$1,490,676	\$0	\$1,490,676	2%
For Profit		\$4,818,218	\$565,763	\$5,383,981	6%
Other		\$5,382,404	\$2,201,277	\$7,583,681	8%
TOTAL		\$74,894,040	\$15,305,458	\$90,199,498	

* Not available.

ALL GRANT ACTIVITY BY FUNDING SOURCE: 1992

GROUP and AMOUNT SUBMITTED:

SOURCE:	KSU	KU	WSU	TOTAL AMOUNT SUBMITTED	% of TOTAL
SCIENCE					
Federal	*	\$61,924,989	\$7,291,946	\$69,216,935	81%
State		\$3,955,810	\$113,715	\$4,069,525	5%
University		\$1,440,259	\$0	\$1,440,259	2%
For Profit		\$4,907,155	\$43,399	\$4,950,554	6%
Other		\$4,772,299	\$1,030,971	\$5,803,270	7%
Subtotal		\$77,000,512	\$8,480,031	\$85,480,543	\$1
MATH					
Federal	*	\$1,448,136	\$783,358	\$2,231,494	99%
State		\$13,562	\$0	\$13,562	1%
University		\$0	\$0	\$0	0%
For Profit		\$0	\$0	\$0	0%
Other		\$0	\$0	\$0	0%
Subtotal		\$1,461,698	\$783,358	\$2,245,056	\$1
ENGINEERING					
Federal	*	\$7,544,931	\$2,272,505	\$9,817,436	64%
State		\$1,290,712	\$0	\$1,290,712	8%
University		\$267,275	\$0	\$267,275	2%
For Profit		\$520,648	\$2,241,217	\$2,761,865	18%
Other		\$1,019,464	\$225,207	\$1,244,671	8%
Subtotal		\$10,643,030	\$4,738,929	\$15,381,959	\$1
SME TOTAL					
Federal	*	\$70,918,056	\$10,347,809	\$81,265,865	79%
State		\$5,260,084	\$113,715	\$5,373,799	5%
University		\$1,707,534	\$0	\$1,707,534	2%
For Profit		\$5,427,803	\$2,284,616	\$7,712,419	7%
Other		\$5,791,763	\$1,256,178	\$7,047,941	7%
TOTAL		\$89,105,240	\$14,002,318	\$103,107,558	

* Not available.

Appendix C

FACULTY SURVEY AND PARTICIPATING DEPARTMENTS

March 30, 1993

Dear :

In 1992, Kansas was selected to participate in NSF's EPSCoR program (Experimental Program to Stimulate Competitive Research). This program is a merit-based program designed to broaden the geographical distribution of Federal funding of academic research and development. Participation is restricted to States that receive relatively little NSF research funding in science, engineering and mathematics. EPSCoR's primary mission is to stimulate systemic and sustainable improvements in the capacities of universities to compete successfully for Federal R&D funds.

NSF requires a yearly assessment of barriers to research and development to evaluate progress that universities are making toward removing those barriers and improving the capacity to compete for Federal R&D funds. To meet this requirement, we are asking science, engineering, and mathematics faculty at KSU, KU, and WSU to complete the attached survey. This survey is designed to determine how things are right now regarding the barriers identified in our 1992 evaluation and to determine if new barriers have arisen. All responses will remain strictly confidential.

Please complete the survey and return in the enclosed envelope by **WEDNESDAY, APRIL 7, 1993**. Thank you for your assistance.

Sincerely,

M. Elizabeth Stella
Associate Scientist
Institute for Public Policy
and Business Research

Steven Maynard-Moody
Associate Professor
Public Administration

I. DEMOGRAPHIC INFORMATION:

1. Department _____ 2. Years employed at this university: _____
3. Title (mark all that apply):
 Nontenured faculty
 Tenured faculty
 Department chair
 University administration
 Nontenure track academic (museum curators, senior/associate/assistant scientists)
 Professional (lab director, institute/program director)
 Other (describe) _____
4. Age: _____ 5. Male _____ Female _____ 6. Minority? Yes _____ No _____

II. EXTENT OF GRANT ACTIVITY

7. Have you submitted grant proposals or contracts to funding sources outside of the university since July 1, 1992?
 Yes No
8. Have you submitted any grant proposals to your university's research fund since July 1, 1991?
 Yes No

III. REWARDS

9. How does your department rate the following during faculty merit reviews? (1 = most important; 6 = least important)
- Undergraduate teaching
 Graduate teaching
 Publications
 Grants submitted
 Grants funded
 Service
10. How does your department rate the following when filling faculty positions? (1 = most important; 6 = least important)
- Undergraduate teaching potential or success
 Graduate teaching potential or success
 Publication potential or success
 Grant funding potential or success
 Service

11. What priority is placed upon applicants' grant potential and success in hiring decisions in your department?

NOW: (circle number)

1	2	3	4	5	Don't Know
Not a				Top	
Priority				Priority	

FIVE YEARS AGO:

1	2	3	4	5	Don't Know
Not a				Top	
Priority				Priority	

IV. GRANT DEVELOPMENT SUPPORT

12. Do you receive any form of support or assistance during grant development?

Yes No (go to Q.18)

13. What is your principle source of grant development support?

Department
 University research/grants administration office
 Other (Specify _____)

14. What type of support do you receive?

Information/networking (funding sources, areas being funded, etc.)
 Mentoring (help while planning/writing grant)
 Word processing
 Photocopying
 Budget development
 Complete routine parts of grant application
 Grant administration
 Other (describe)_____

15. How would you rate the extent (depth and breadth) of the grant development/administration support you receive?

1	2	3	4	5
Super-				Compre-
ficial				hensive

16. How would you rate the efficiency of the grant development/administration support you receive?

1 2 3 4 5
Very Very
Inefficient Efficient

17. Describe the level of grant development/administration support you have received for the past five years?

_____ Decreasing _____ No change _____ Increasing _____ Don't Know

18. How would you rate the availability of university seed grants to support pilot research?

NOW:

1 2 3 4 5 Don't Know
Not Easily
Available Obtained

ONE YEAR AGO:

1 2 3 4 5 Don't Know
Not Easily
Available Obtained

19. How frequently do you contact funding agencies to find out about funding opportunities or grant development?

_____ Have not contacted any in the past 5 years
_____ Once every 3-5 years
_____ Every two years
_____ Once a year
_____ Once a semester or more

V. RESEARCH EQUIPMENT

20. Do you require equipment to conduct your research?

_____ Yes _____ No (go to Q.24)

21. How would you describe the equipment that is most critical to your research?

_____ Not available due to lack of space, funds, support services, etc.
_____ Old, obsolete and/or unreliable (unable to repair, maintain, etc.)
_____ Adequate but soon will be obsolete or inadequate
_____ Adequate
_____ Competitive
_____ State of the art

22. How would you describe current funding for equipment repair, replacement, and expansion?

NOW:

1	2	3	4	5	Don't Know
Not Available				Always Available	

FIVE YEARS AGO:

1	2	3	4	5	Don't Know
Not Available				Always Available	

23. To what extent does the current state of your equipment affect your ability to obtain external grant funding?

1	2	3	4	5	
Prevents				Provides Competitive Edge	

24. How difficult is it to deal with purchasing regulations?

NOW:

1	2	3	4	5	Don't Know
Extremely Difficult				Extremely Easy	

FIVE YEARS AGO:

1	2	3	4	5	Don't Know
Extremely Difficult				Extremely Easy	

VI. RESEARCH FACILITIES

25. How would you describe the research facility you are currently using?

1	2	3	4	5	
Not Adequate				State of the art	

26. To what extent does the current condition of your facility impact your ability to obtain external grant funding?

1	2	3	4	5	
Prevents	Neutral			Provides Competitive Edge	

VII. TECHNICAL SUPPORT AND SERVICES

27. Do you need some form of technical support and services to conduct your research?

_____ Yes _____ No (go to Q.32)

28. If YES, how would you describe the availability of that support?

1	2	3	4	5
Not				Always
Available				Available

29. If technical support and services are available to you, where do you obtain them?

30. How would you describe the technical support and service facilities?

NOW:

1	2	3	4	5
Not				Supports Cutting
Adequate				Edge Research

FIVE YEARS AGO:

1	2	3	4	5	Don't Know
Not				Supports Cutting	
Adequate				Edge Research	

31. If you do not have access to technical support and service, what type do you need?

VIII. PERSONNEL

32. How many students do you currently direct in research projects at each of the following levels? Please count only those for whom you are the principle advisor. (If you direct no students, go to Q. 34)

_____ Undergraduate level
_____ Master level
_____ Predoctoral level
_____ Post doctoral level
_____ Other (describe) _____

33. How many graduate and post doctoral students do you fund through research grants?

Graduate _____ Post doctoral _____

34. How would you describe your department's ability to recruit graduate students?

NOW:

1	2	3	4	5
Very				Excellent
Poor				

FIVE YEARS AGO:

1	2	3	4	5	Don't Know
Very				Excellent	
Poor					

35. How would you describe the quality of the graduate students your department recruits?

NOW:

1	2	3	4	5
Very				Excellent
Poor				

FIVE YEARS AGO:

1	2	3	4	5	Don't Know
Very				Excellent	
Poor					

36. What is the biggest barrier to recruiting graduate students to your department?

- Lack of funding
- Noncompetitive salaries
- Lack of fee waivers for RAs
- Departmental reputation
- Lack of industrial base in Kansas
- Other (describe) _____

37. How would you describe the balance between the undergraduate education and graduate education mission within your department?

1	2	3	4	5
Under-				Graduate
graduate				Emphasis
Emphasis				

38. How would you describe the number of faculty in your department?

NOW:

1	2	3	4	5
Too				Too
Few				Many

FIVE YEARS AGO:

1	2	3	4	5	Don't Know
Too				Too	
Few				Many	

39. How would you describe your department's ability to recruit faculty who are excellent teachers and are also nationally recognized research scientists?

NOW:

1	2	3	4	5
Poor				Excellent

FIVE YEARS AGO:

1	2	3	4	5	Don't Know
Poor				Excellent	

40. How would you describe your department's ability to retain faculty who are excellent teachers and are also nationally recognized research scientists?

1	2	3	4	5
Poor				Excellent

41. What is the biggest barrier to recruiting and retaining faculty in your department with potential for or proven excellence in teaching and research?

- Inadequate start-up packages for new faculty
- Heavy teaching loads
- Inadequate facilities
- Inadequate equipment
- Inadequate support services
- Overhead distribution policies
- Departmental reputation
- Salaries
- Other (describe) _____

42. Are you currently involved in collaborative/team research projects?

Yes No (go to Q.44)

43. If YES, how many of your current collaborative/team research projects fit the following descriptions:

Involve faculty within my department only

Involve faculty outside my department

Involve faculty on different campuses within the state

Involve faculty at out-of-state institutions

Other (describe) _____

IX. OTHER

44. What is the biggest barrier to research productivity and external funding?

45. Please describe any positive or beneficial outcomes of the NSF EPSCoR process that you have seen or experienced.

46. Other comments or concerns?

KU Depts Participating in EPSCOR SURVEY

Aerospace Engineering
Animal Care
Anthropology
Biochem Res Serv L
Biological Sciences
Biological Survey
Bur Child Res/LifeSpan
Chem & Petrol Engr
Chemistry
Civil Engineering
Computer Science
Ct Excel/Higuchi Cts
Ctr for Biomed Research
Economics
Elect & Computer Engr
Engineering Admin
Engineering Managt Pro
Geography
Geology
Gerontology Ctr
Higuchi Sci Cts Admin
Human Dev & Fam Life
IPPBR
KS Geological Surv
Mass Spectrometer Lab
Mathematics
Mechanical Engineering
Medicinal Chemistry
Microbiology
Museum of Nat History
NMR Lab
Pharm Chemistry
Pharm & Tox
Pharmacy Practice
Physics & Astronomy
Psychology
Science Instrum Lab
Sociology
Tertiary Oil Recov

K-State Depts Participating

Accounting
Ag Dept of Communications
Agricultural Engineering
Agriculture Economics
Agronomy
Anatomy & Physiology
Animal Sci & Industry
Arch Engr & Const Sci
Biochemistry
Biology
Chemical Engineering
Chemistry
Civil Engineering
Clinical Sciences
Dean of Vet Medical Ctr
Dept of Computer & Info Sci
Div of Biology
Economics
Electrical & Computer Engr
Engineering Technology
Entomology
Fort Hays Ag. Exp. Station
Geography
Geology
Grain Sci & Industry
Hort Forest & Rec Resources
Industrial Engineering
Marketing
Mathematics
Mechanical Engineering
Modern Languages
Nuclear Engineering
NW Research Exten. Cnt
Pathology & Microbiology
Physics
Plant Pathology
Political Science
Psychology
SE Ag. Exp. Station
Soc Anthro & Soc Work
Speech
Statistics
SW Research Ext. Cnt
Veterinary Diagnostic In.

Wichita State University Depts Participating

Aerospace Engineering
Anthropology
Biological Sciences
Chemistry
Communicative Disorders
Computer Science
Curriculum & Instruction
Dean's Office, College of Health
Dental Hygiene
Electrical Engineering
Engineering, Dean's Office
Geology
Gerontology Center
Health Admin & Gerontology
Industrial Engineering
Industrial Technology
Mathematics & Statistics
Mechanical Engineering
Medical Technology
Nursing
Physical Therapy
Physics
Psychology
Wind Tunnel/Engineering

Appendix D

TECHNICAL SUPPORT AND SERVICES NEEDED

Technical Support and Services

Group:	Type:
KSU	Technician, computer maintenance, software developer Modem contact and accessibility to main frame Graphics personnel, electronics shop Computation support services Good computer support Networking support Protein purification Research assistant Statistical/design consulting Analytical help (chemical and biological) Grad students and M.S. level support staff for research
KU	Computer technicians, electronics technicians. Better machine shop, rapid renovation of space when funds are available. Need more cooperations from departments that can provide support and service. Mechanical/electronic repair. Electronics & computing troubleshooting, metal fabrication. X-ray, NMR, Mass Spec. Additional journals in the library. Need computer programming assistance. Computer graphics. Electronics specialist, analytical chemist. Apparatus construction, computer programming. Computer/data analysis, software development. Computer/statistical support. Analytical chemistry, X-ray diffraction and related equipment. Additional \$ for equipment & <u>support</u> (i.e. staff & repair) Better trained computer staff. The need is larger than can be described in any detail in this small space. Technicians for repair and maintenance. Histology, photography. A good UNIX systems manager. Electronics. Stats consultants. Statistical consulting from someone whose job it is. All types of chemical and physical measurement. Developing instrumentation. Statistical consulting.

Group:

Type:

WSU

Glass blowing, electronic shop, machine shop
Specimen preparation (histology); radiology;dissection, software aids, photography
Technician
Trained technicians
Glass blowing, mass. spec.,analytical services, x-ray diffraction
Computer programming, equipment fabrication
Sample preparation/instrument operation assistance and data evaluation help
Mainframe support for large data sets, ability to download to PCs through LANs
CIM
Additional technical support
Time
Biomedical and electronic
Through collaboration
Electronics expert

Appendix E

BARRIERS TO RESEARCH PRODUCTIVITY AND EXTERNAL FUNDING

BARRIERS TO RESEARCH PRODUCTIVITY AND EXTERNAL FUNDING

	Number of Faculty:			
	KSU	KU	WSU	TOTAL
Degree of support for research mission:				
Lack of time	32	26	14	72
Heavy teaching load; emphasis on undergraduate teaching	7	17	18	42
Subtotal	39	43	32	114
Administrative barriers (lack of support or leadership, climate/focus)	10	23	6	39
Overhead not reinvested in research enterprise	1	4	1	6
TOTAL	50	70	39	159
PERCENT OF TOTAL	31%	32.5%	46%	35%
Infrastructure:				
Physical				
Equipment needs	12	12	2	26
Inadequate facilities	9	12	6	27
Subtotal	21	24	8	53
Human				
Quality/quantity of graduate students	9	9	4	22
Inadequate technical support	12	8	1	21
Lack of critical mass, especially of research active faculty for collaboration/mentoring,etc.	4	12	7	23
Subtotal	25	29	12	66
TOTAL	46	53	20	119
PERCENT OF TOTAL	29%	25%	23.5%	26%
Funding:				
Limited funding & increased competition for extramural funds	24	19	4	47
Lack of/inadequate seed money	8	10	1	19
Graduate student support/RA fee waiver	2	7	1	10
Lack of stable state support	2	2	0	4
Lack of matching funds	1	2	0	3
TOTAL	37	40	6	83
PERCENT OF TOTAL	23%	19%	7%	18%

	Number of Faculty:			
	KSU	KU	WSU	TOTAL
Grant development/administration:				
Inadequate support	3	21	6	30
Purchasing process/regulations	1	6	0	7
TOTAL	4	27	6	37
PERCENT OF TOTAL	2.5%	12.5%	7%	8%
Incentives/reward system:				
Low salaries/salary compression	5	2	1	8
Lack of rewards/incentives	4	10	3	17
TOTAL	9	12	4	25
PERCENT OF TOTAL	6%	5.5%	5%	5%
Reputation:				
Lack of "stars", track record	2	2	2	6
Lack of cutting edge research reputation	2	3	6	11
TOTAL	4	5	8	17
PERCENT OF TOTAL	2.5%	2%	9%	4%
Other: TOTAL	9	8	2	19
PERCENT OF TOTAL	6%	4%	2%	4%
TOTAL NUMBER OF COMMENTS	159	215	85	459
TOTAL NUMBER OF FACULTY RESPONDING TO QUESTION	315	116	143	56