SWOT FOLLOWUP:

Examination of the ERC Program by Center Staff and Center Funding Status

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Table 1.—Distribution of respondents, by center funding status

Center funding status	Percent	Number
Newly funded	49	36
Mature	27	20
Phasing down	15	11
Self-sustaining	8	6
Total	100	73

NOTE: Percents may not sum to 100 due to rounding.

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Table 2.—Distribution of respondents, by their role in the center

Center role	Percent	Number
Center director	25	18
Deputy director	15	11
Education director	21	15
Industrial liaison	19	14
Administrative director	21	15
Total	100	73

NOTE: Percents may not sum to 100 due to rounding.

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Table 3.—ERC placement in four NSF funding categories, by center funding status*

Newly funded	Mature	Phasing down	Self-sustaining
Advanced Engineering Fibers and Films	Biotechnology Process Engineering	Data Storage Systems	Collaborative Manufacturing
Engineering Living Tissue	Particle Science and Technology	Computational Field Simulation	Advanced Electronic Materials Processing
Marine Bioproducts Engineering	Low Cost Electronic Packaging	Biofilm Engineering	Offshore Technology
Computer Engineered Surgical Systems	Neuromorphic System Engineering		
Power Electronic Systems	Environmentally Benign Semiconductor Manufacturing		
	Innovative Product Development		
	Reconfigurable Machining Systems		
	Integrated Media Systems Center		
	Engineered Biomaterials		

*Includes only those centers with one or more staff responding to the survey.

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Findings

We have organized our findings around the major sections of the survey. These are center operations, funding, overhead, and NSF ERC Program Directors.

Center operations. During the SWOT analysis, ERC staff members stated that *ancillary program goals* weakened attempts to produce high-quality research because of the constraints they placed on staff time and center budgets. In the SWOT followup study, staff members were asked to choose a center operation they would recommend eliminating, and one they would recommend reducing in scope in order to focus more on the core mission. The center operations were organized around four general categories: research, education, industrial interaction, and administration, with lists of more specific center operations offered under each general category.

Overall, responses for the questions regarding preferences for eliminating or reducing center operations yielded a large number of different responses, with relatively little agreement. The highest ranked functions to eliminate, as shown in table 4, were:

- K-12 educational outreach (27 percent),
- One of the two IAB meetings each year (16 percent), and
- Outside scientific advisory boards (15 percent).

Table 4.—Center staff suggestions of center operations to eliminate, by center funding status

Operation	Respondents selecting each operation					
	Percent	Number				
		Total	Newly funded	Mature	Phasing down	Self-sustaining
K-12 educational outreach	27	20	7	10	1	2
One of the two IAB meetings	16	12	2	4	4	2
Outside scientific advisory boards	15	11	3	5	3	0
Development of courses for practitioners	8	6	3	3	0	0
ERC courses for undergraduates	6	4	2	2	0	0
Educational outreach to graduate and undergraduate students	4	3	0	3	0	0
Workshops with industry	3	2	0	2	0	0
Outreach to non-ERC researchers	1	1	0	1	0	0
ERC courses for graduate students	1	1	0	0	0	1
Internships for students in industry	1	1	0	0	1	0
Industrial liaison officer position	1	1	0	0	0	1
Other	6	4	2	1	1	0
Missing	10	7	1	5	1	0
Total	100	73	20	36	11	6

NOTE: Percents may not sum to 100 due to rounding.

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

When asked about functions that might be reduced, the respondents cited:

- K-12 educational outreach (15 percent),
- ERC research-related courses for undergraduate students (15 percent), and
- Outreach to non-ERC researchers (14 percent) (table 5).

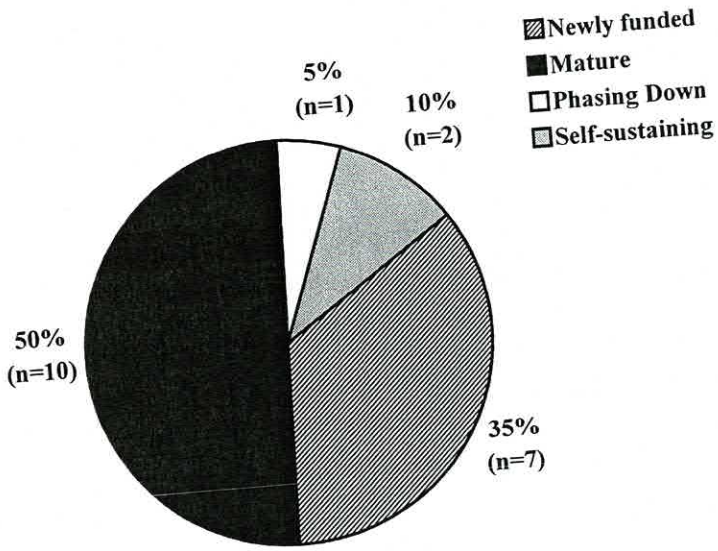
Table 5.—Center staff suggestions of center operations to reduce in scope, by center funding status

Operation	Respondents selecting each operation					
	Percent	Number				
		Total	Newly funded	Mature	Phasing down	Self-sustaining
K-12 educational outreach	15	11	3	6	2	0
ERC courses for undergraduate students	15	11	3	2	4	2
Outreach to non-ERC researchers	14	10	3	6	1	0
Educational outreach to graduate and undergraduate students	7	5	1	3	0	1
Two of the IAB meetings	7	5	0	5	0	0
Outside scientific advisory boards	6	4	1	1	1	1
Administrative staff	6	4	1	1	0	2
Strategic planning	4	3	1	2	0	0
Cross-disciplinary team approach to research for undergraduate students	3	2	1	0	1	0
Development of courses for practitioners	3	2	1	1	0	0
One of the two IAB meetings	3	2	0	1	1	0
Internships for students in industry	3	2	0	2	0	0
Industrial liaison officer position	3	2	2	0	0	0
Cross-disciplinary team approach to research for graduate students	1	1	0	1	0	0
Workshops with industry	1	1	1	0	0	0
Other	3	2	1	1	0	0
Missing	8	6	1	4	1	0
Total	100	73	20	36	11	6

NOTE: Percents may not sum to 100 due to rounding.

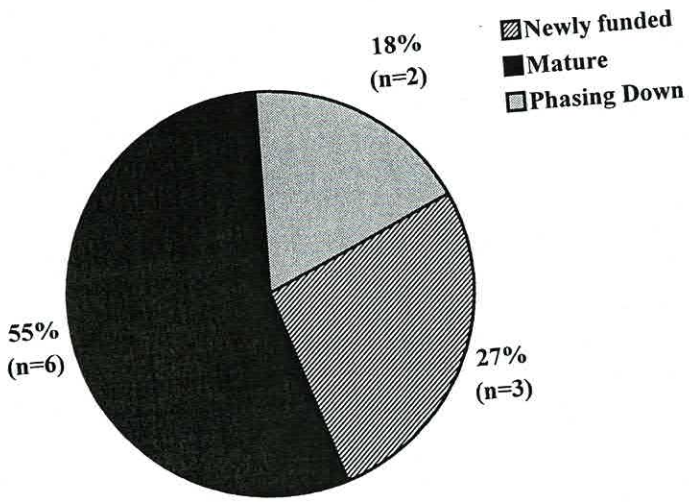
SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Figure 2.—Center staff suggesting elimination of K-12 educational outreach, by center funding status



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

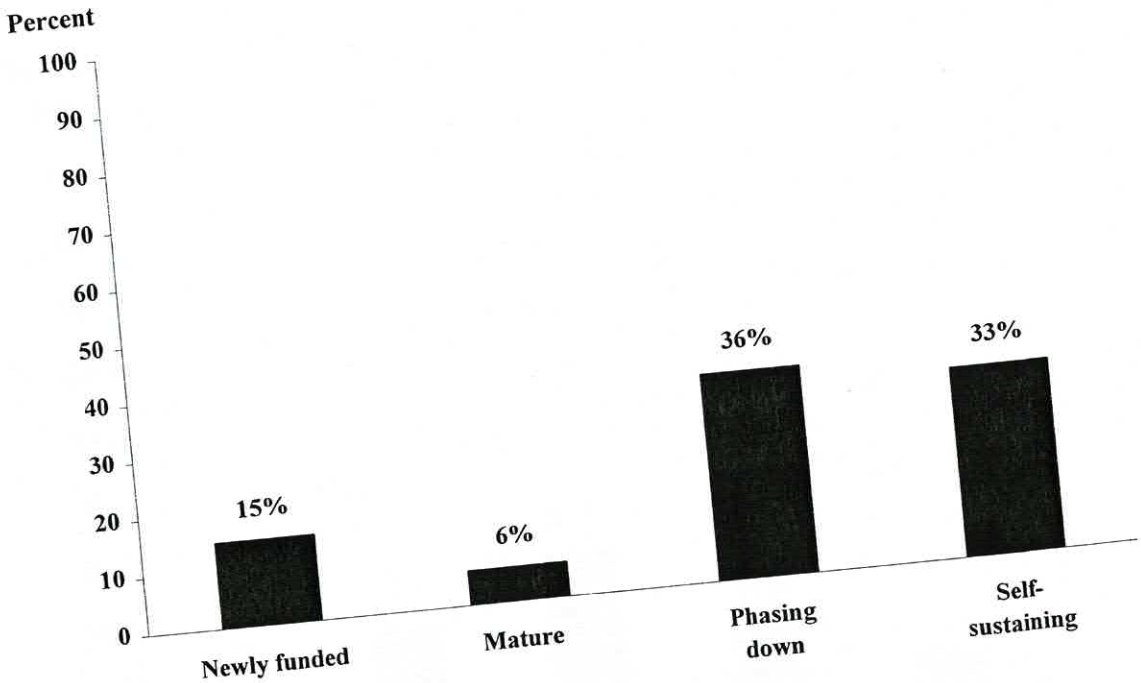
Figure 3.—Center staff suggesting reduction of K-12 educational outreach, by center funding status



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Figure 4 shows that the centers that were phasing down or self-sustaining were more likely than newly funded and mature centers to want to reduce ERC courses for undergraduate students (36 and 33 percent, respectively, compared to 15 and 6 percent, respectively).

Figure 4.—Center staff suggesting reduction of ERC courses for undergraduate students, by center funding status



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Centers Program, "SWOT Follow-up: Examination of ERC Program by Center Staff and Center Funding Status," 2000

Funding. Due to concerns stated in the SWOT analysis that funding was not well matched with program expectations, center staff members were asked to indicate which center operations they would give first priority for additional funding if base budgets were increased by 25 percent, and which center operation they would give second priority for additional resources.[6] Again, as table 6 shows, a wide range of responses with little overall agreement was offered for the highest priorities for additional funding:

- An engineered systems focus (26 percent),
- Increased systems-wide work (12 percent), and
- A cross-disciplinary team approach to research for graduate students (10 percent).

Table 6.—First priority of center staff for increased center funding, by center funding status

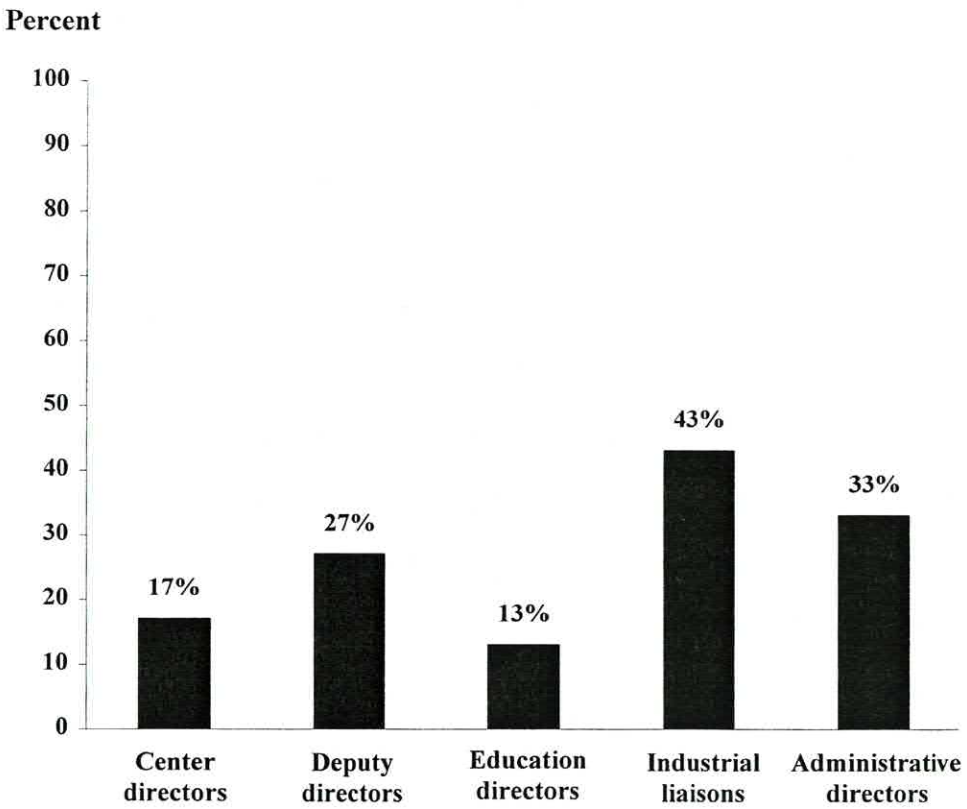
Activity	Respondents selecting each operation					
	Percent	Number				
		Total	Newly funded	Mature	Phasing down	Self-sustaining
Engineered systems focus	26	19	6	7	4	2
Increased systems-wide work	12	9	2	4	3	0
Cross-disciplinary team approach to research for graduate students	10	7	1	5	0	1
Equipment	8	6	1	4	1	0
ERC courses for undergraduate students	7	5	3	1	0	1
Administrative staff	6	4	0	3	1	0
ERC courses for graduate students	4	3	1	2	0	0
Outreach to non-ERC researchers	3	2	2	0	0	0
Internships for students in industry	3	2	1	1	0	0
Industrial liaison officer position	3	2	0	2	0	0
Workshops with industry	3	2	0	1	1	0
Outside scientific advisory boards	1	1	0	1	0	0
Educational outreach to graduate and undergraduate students	1	1	0	0	0	1
Development of courses for practitioners	1	1	1	0	0	0
Administrative manager	1	1	1	0	0	0
Other	7	5	1	3	0	1
Missing	4	3	0	2	1	0
Total	100	73	20	36	11	6

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

[6] The center operations were organized around four general categories (research, education, industry, and administration) with lists of specific center operations.

Figure 6 indicates that with regard to the priority assigned to funding for an engineered systems focus, industrial liaisons were again overrepresented compared to administrative directors, deputy directors, center directors, and education directors.

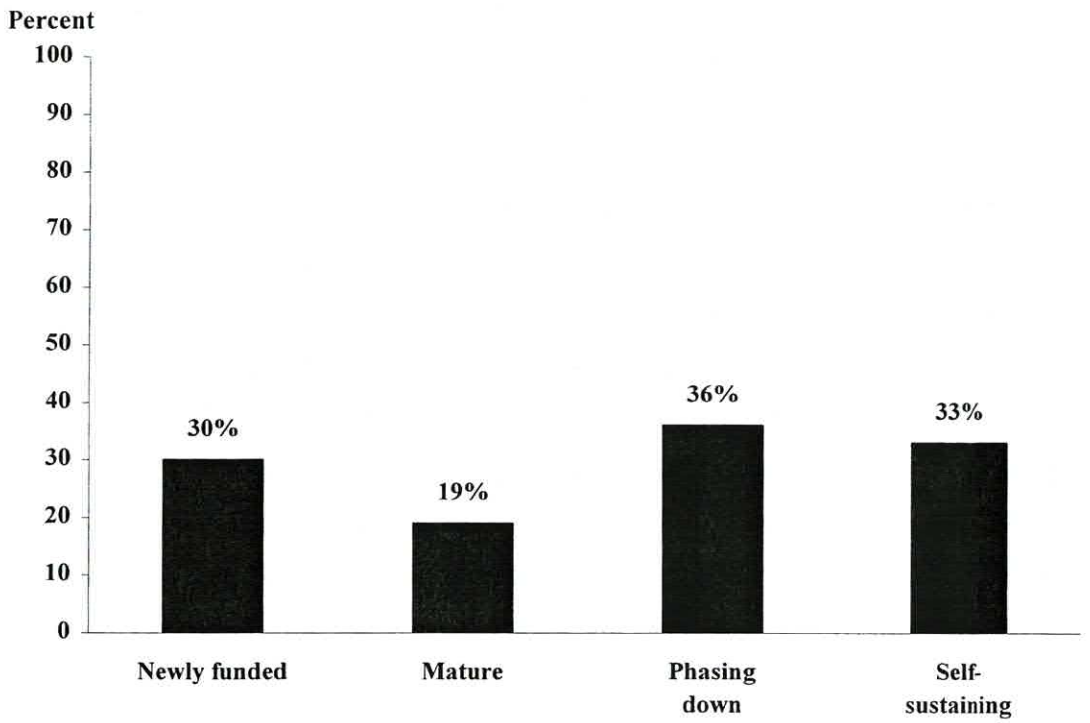
Figure 6.—Engineered systems focus as the first priority for increased funding, by staff role



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Respondents' interest in their center's engineered systems focus as a priority for increased funding also varied by their center's ERC program funding status. Compared to mature centers, there was moderate agreement among staff at phasing down, self-sustaining, and newly funded centers regarding their engineered systems focus as their first priority (figure 7).

Figure 7.—Engineered systems focus as the first priority for <u>increased</u> funding, by center funding status



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Table 7 shows that the second priority for increasing funding among respondents was:

- Equipment (14 percent),
- A cross-disciplinary team approach to research for graduate students (12 percent), and
- Strategic planning (10 percent).

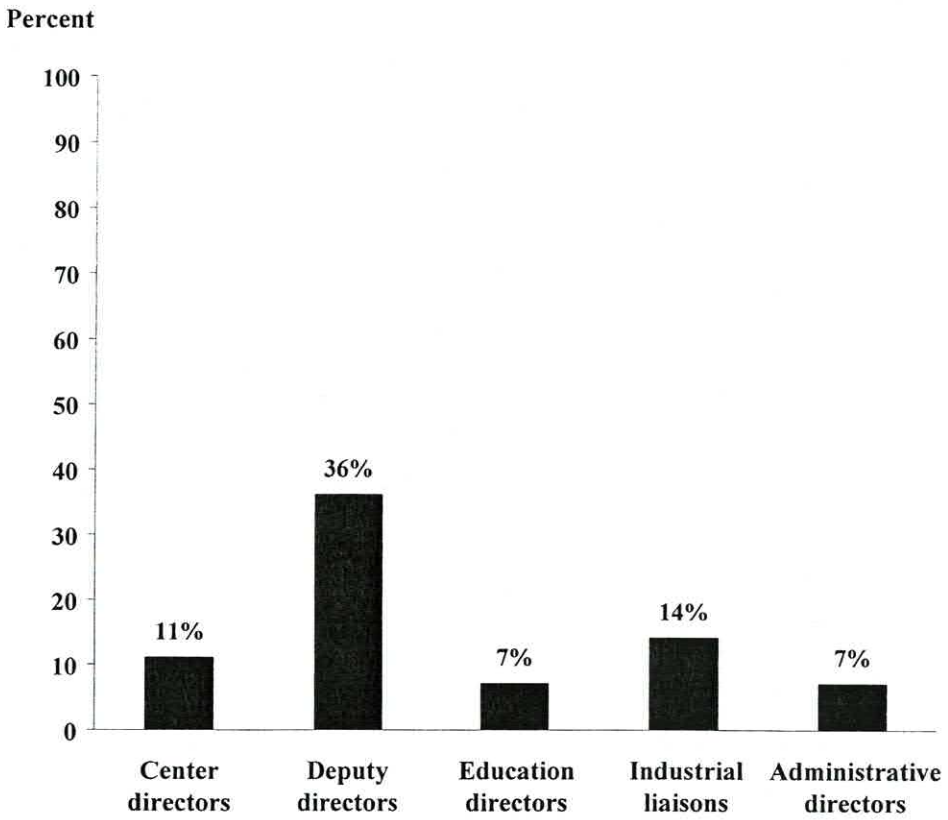
Table 7.—Second priority of center staff for increased center funding, by center funding status

Activity	Respondents selecting each operation					
	Percent	Number				
		Total	Newly funded	Mature	Phasing down	Self-sustaining
Equipment	14	10	4	4	0	2
Cross-disciplinary team approach to research for graduate students	12	9	3	4	1	1
Strategic planning	10	7	1	1	5	0
Increased systems-wide work	8	6	2	4	0	0
Internships for students in industry	8	6	1	3	1	1
Administrative staff	8	6	0	5	0	1
Educational outreach to K-12	7	5	4	1	0	0
Outreach to non-ERC researchers	6	4	0	2	2	0
Educational outreach to graduate and undergraduate students	6	4	2	2	0	0
Development of courses for practitioners	4	3	0	2	0	1
ERC courses for undergraduate students	3	2	0	1	1	0
Workshops with industry	3	2	0	2	0	0
Engineered systems focus	1	1	0	1	0	0
Cross-disciplinary team approach to research for undergraduate students	1	1	1	0	0	0
ERC courses for graduate students	1	1	0	1	0	0
Industrial liaison officer position	1	1	1	0	0	0
Administrative manager	1	1	1	0	0	0
Missing	6	4	0	3	1	0
Total	100	73	20	36	11	6

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Deputy directors were far more likely than any other type of center staff to select equipment as their second priority if additional funds were available (figure 8).

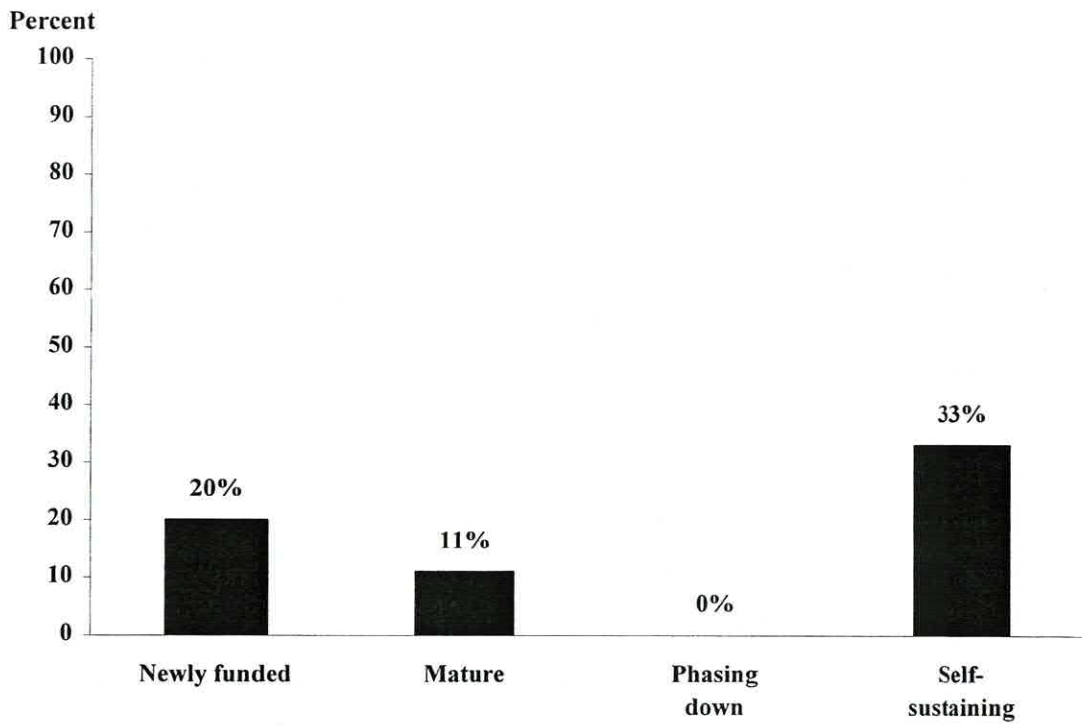
Figure 8.—Equipment is the second priority for <u>increased</u> funding, by staff role



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

From the perspective of funding status, center staff at self-sustaining centers were clearly more interested in augmenting their equipment as a second priority if additional funding were available. As figure 9 shows, this contrasts sharply with staff at centers that are phasing down, who had no interest in doing so.

Figure 9.—Equipment is the second priority for <u>increased</u> funding, by center funding status



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Looking across funding priority findings, it is clear that the funding status and, to a lesser extent, one's role in a center affect what is important to center staff. Interestingly, the findings relating to center funding status are more easily explainable than are those pertaining to respondents' roles in the center.

Overhead costs. In the SWOT analysis, participants expressed discontentment with center overhead costs in terms of both time and money. The SWOT followup survey asked center staff to define what they meant by "overhead," and to indicate whether "overhead" increased, decreased, or stayed the same within the last 3 years. The definitions respondents provided for overhead generally covered the same categories:

- Detailed reporting requirements,
- Trips to NSF,
- Conferences,
- Questionnaires, and
- Other tasks that take time away from the core mission of research.

When asked about the state of overhead within the last 3 years, more than half of the respondents (53 percent) stated that overhead costs had gone up, and one-third stated that they have stayed the same (table 8).[7]

Table 8.—Distribution of center staff views of overhead cost changes during the last 3 years

View	Percent	Number
Gone up	53	28
Stayed the same	34	18
Gone down	4	2
Missing	10	5
Total	100%	53

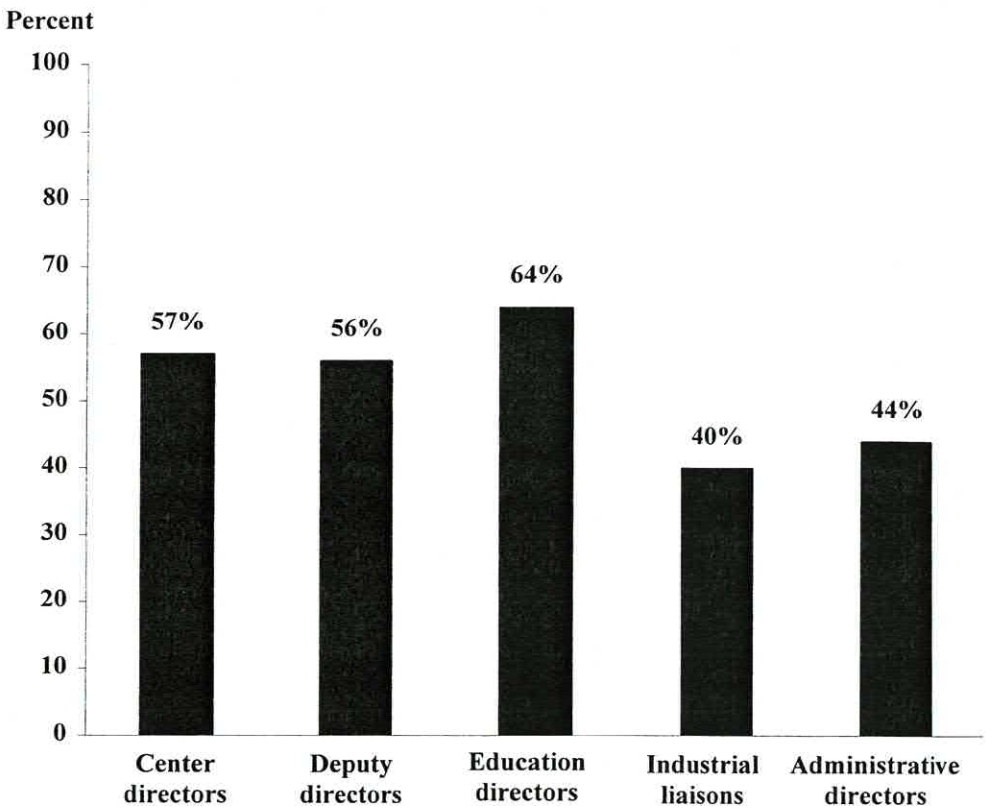
NOTE: Responses from all staff at newly funded centers were excluded (n = 20). Percents may not sum to 100 due to rounding.

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

[7] Center staff from newly funded centers were excluded from this analysis since they have only been in existence since 1998.

Compared to industrial liaisons and administrative directors, figure 10 shows that the majority of center directors, deputy directors, and education directors felt that overhead increased over the last 3 years.

Figure 10.—Center staff views of overhead cost increases in the last 3 years, by staff role

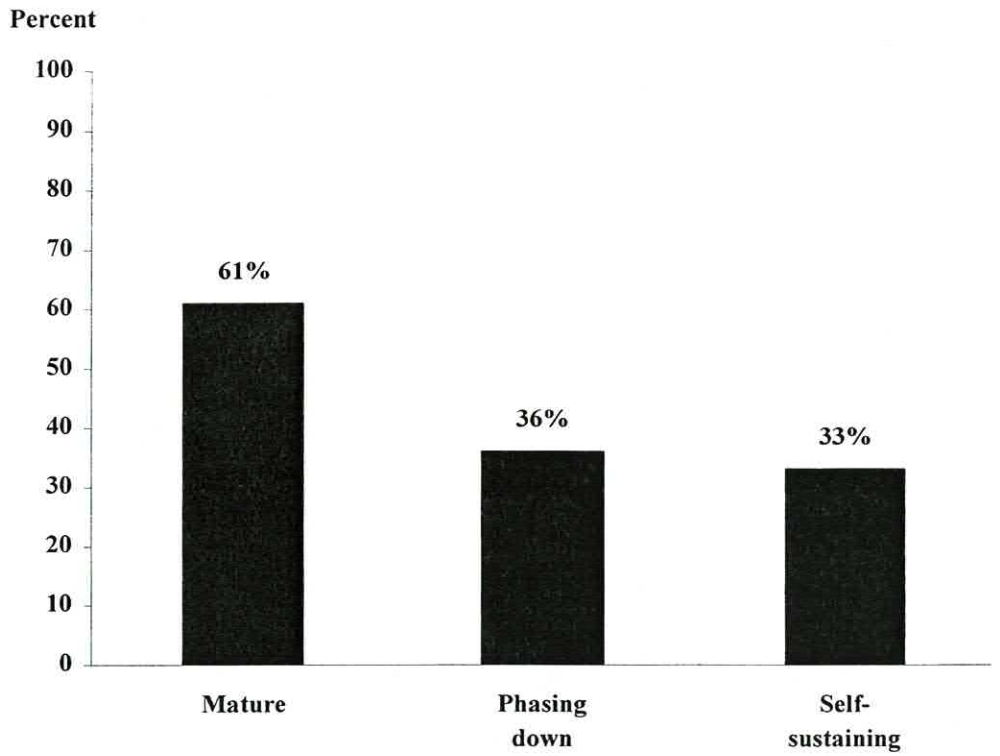


NOTE: Responses from all staff at newly funded centers were excluded.

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Figure 11 shows that mature centers were somewhat overrepresented in the view of overhead costs. Sixty-one percent indicated that overhead had increased in the last 3 years, compared to 36 percent of the phasing down centers and 33 percent of the self-sustaining centers.

Figure 11.—Center staff views of overhead cost increases in the last 3 years, by center funding status



NOTE: Responses from all staff at newly funded centers were excluded.

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

NSF Program Directors (PDs). Center staff expressed some concerns about their ERC PDs in the SWOT analysis, particularly that some of their PDs lacked appropriate technical knowledge and familiarity with center research missions.

When asked to report how their *least* effective PD rated on various dimensions of support and knowledge, center staff indicated that their least effective PD was weak in the following areas:

- Sound managerial advice (47 percent),
- Related technical background (44 percent), and
- Familiarity with the interests, needs, and constraints of relevant industry sectors (38 percent) (table 9).

Table 9.—Distribution of center staff ratings of their least effective PD on various dimensions

Dimension	Percent				
	Strong	Adequate	Weak	Missing	Total
Familiarity with ERC program goals, practices, and processes	35	44	12	9	100
Close technical background to center's technical area	18	32	44	6	100
Familiarity with the interests, needs, and constraints of relevant industry sectors	12	44	38	6	100
Provides sound managerial advice	12	32	47	9	100

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

When asked to report how their *most* effective PD rated on the same dimensions, there was a consensus among center staff that their most effective PD was highly familiar with ERC goals, practices, and processes (74 percent). However, areas highlighted as weaknesses in the least effective PDs only obtained "adequate" ratings by most respondents for their most effective PD; and only about one-quarter felt their PDs were "strong" in those areas:

- Sound managerial advice (37 percent),
- Familiarity with the interests, needs, and constraints of relevant industry sectors (27 percent), and
- Related technical background (23 percent) (table 10).

Table 10.—Distribution of center staff ratings of their <u>most</u> effective PD on various dimensions

Dimension	Percent				
	Strong	Adequate	Weak	Missing	Total
Familiarity with ERC program goals, practices, and processes	74	20	0	6	100
Provides sound managerial advice	37	46	10	7	100
Familiarity with the interests, needs, and constraints of relevant industry sectors	27	44	13	16	100
Close technical background to center's technical area	23	43	16	19	100

NOTE: Percents may not sum to 100 due to rounding.

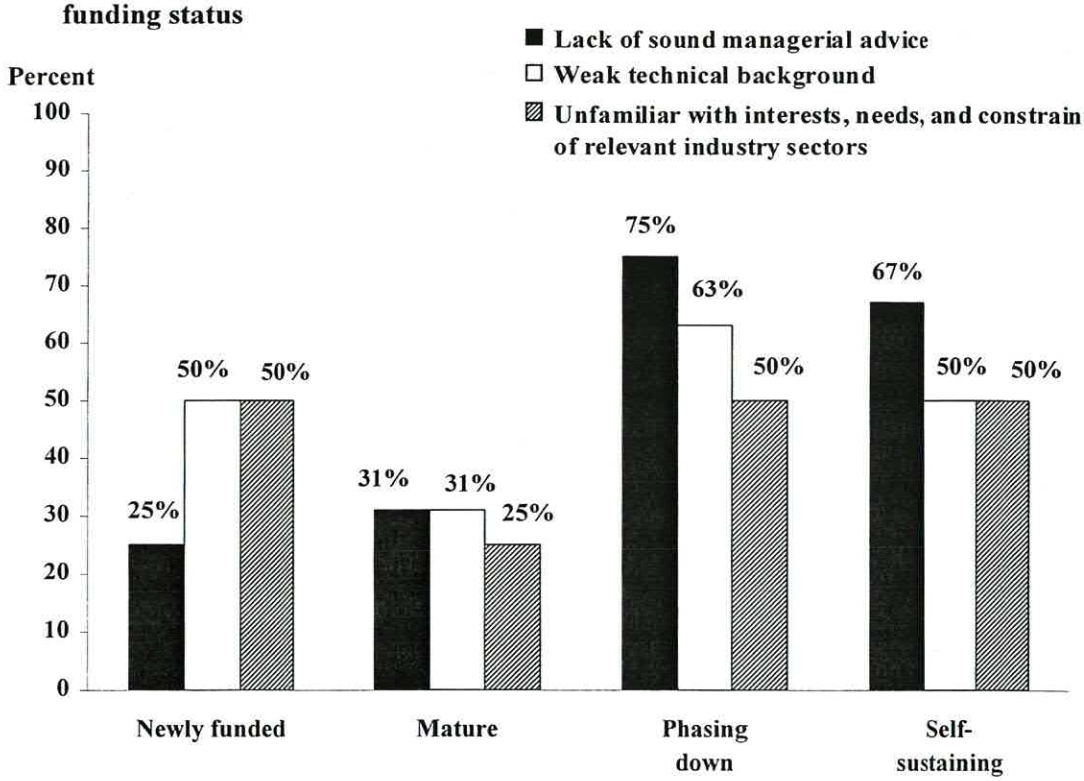
SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Nonetheless, comparisons of the two sets of responses suggests that effective PDs, in contrast to ineffective ones, are individuals who understand NSF goals for the ERCs and can provide sound managerial advice. Effective PDs are individuals who provide good assistance to the ERC directors on managing their centers, making critical decisions, and proceeding through the stages of being an ERC. In fact, the dimension that was rated most frequently as weak among least effective PDs – sound managerial advice — was frequently viewed as a strength among the most effective PDs. While effective PDs also had somewhat stronger ratings in technical background and familiarity with the interests, needs and constraints of relevant industry sectors, most still were seen to be only "adequate" in those areas. The primary distinction is a reduction in those judged to be "weak."

Reported weakness in PDs differed by center funding status with newly funded and mature centers differing from those centers that were phasing down or self-sustaining.[8]

- Seventy-five percent of those from phasing down centers and 67 percent of those from self-sustaining centers cited lack of sound managerial advice, compared to 31 percent of staff at mature centers and 25 percent of staff at newly funded centers.
- Sixty-three percent of those at phasing down centers, 50 percent of those at self-sustaining centers, and 50 percent of those at newly funded centers cited a weak technical background, compared to 31 percent at the mature centers.
- Fifty percent of those from phasing down, self-sustaining, and newly funded centers indicated that their least effective PD was unfamiliar with the interests, needs, and constraints of relevant industry sectors, while 25 percent of staff from newly funded centers chose this option (figure 12).

Figure 12—Center staff ratings of the primary weakness of their least effective PD, by center funding status



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

[8] Cautionary note: The questionnaire was designed to assess center staff ratings of their most and least effective PD. Center staff who had only known one PD were instructed to answer only one question, either the question regarding their least effective or their most effective PD. Only 4 out of 20 center staff at newly funded centers responded to the question regarding their least effective PD.

In summary, these results from figure 12 show that older centers (phasing down and self-sustaining) have had more trouble with these PD weaknesses than have newly funded or mature centers; in particular, staff from older centers were most critical of their least effective PDs managerial advice.

When asked to rank the importance of the aforementioned PD characteristics, more center staff reported that PD familiarity with ERC goals, practices, and processes was important than any other PD characteristic (table 11).

Table 11.—Distribution of center staff rankings of PD characteristics

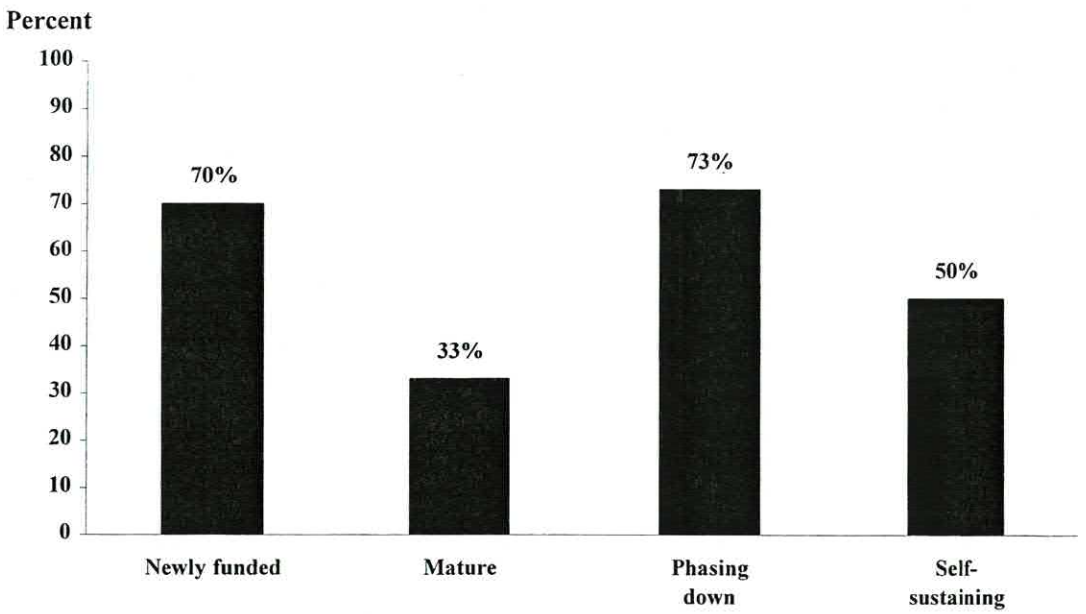
Dimension	Percent						
	Most important	Important	Neutral	Less important	Least important	Missing	Total
Familiarity with ERC program goals, practices, and processes	51	18	12	12	1	6	100
Close technical background to center's technical area	16	26	22	23	4	8	100
Familiarity with the interests, needs and constraints of relevant industry sectors	14	21	30	26	0	10	100
Provides sound managerial advice	11	23	22	29	6	10	100

NOTE: Percents may not sum to 100 due to rounding.

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

A high proportion of staff from newly funded and phasing down centers reported that PD familiarity with ERC goals, practices, and processes was the most important characteristic compared to staff at mature and self-sustaining centers (figure 13).

Figure 13—Center staff rankings of familiarity with ERC goals, practices and processes as the most important characteristics, by center funding status



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Since rapid turnover of PDs was also a concern among SWOT participants, the SWOT followup study asked center staff to state the number of PDs who had been assigned to their center. Overall, 40 percent indicated that their center had had only one PD; 18 percent had had two PDs, and 26 percent indicated that their center had had three PDs. Table 11 shows the full range of numbers of PDs reported.

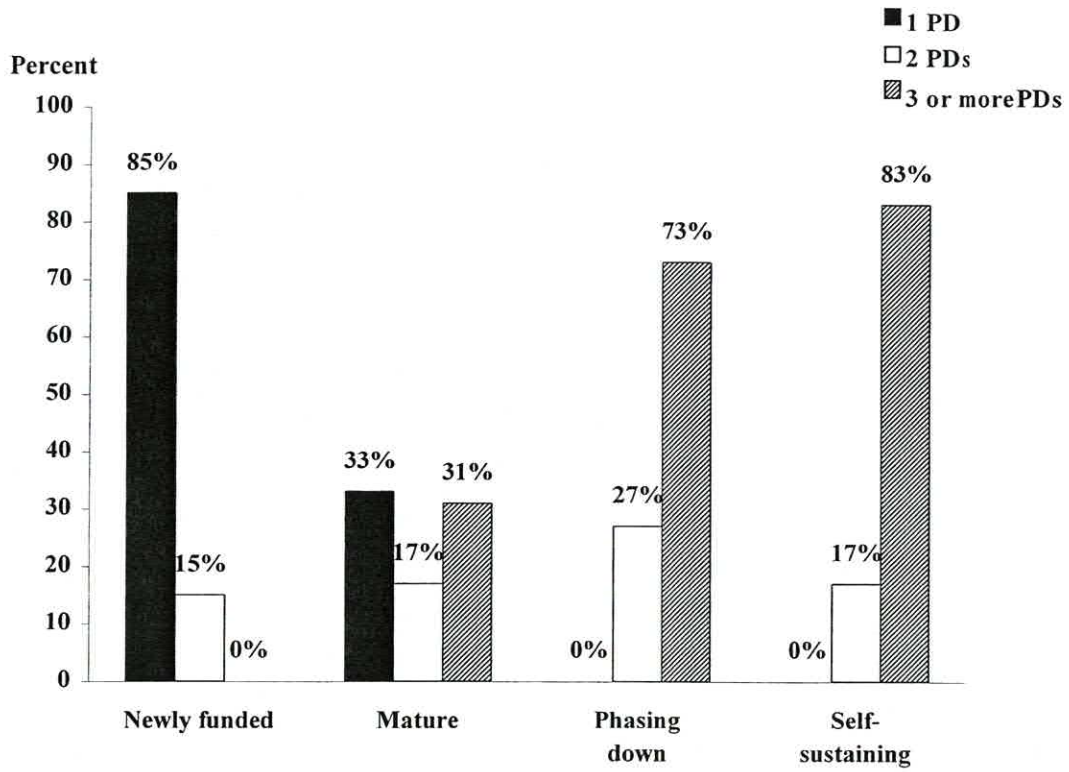
Table 12.—Number of PDs per center as reported by center staff

Number of directors	Percent	Number
One	40	29
Two	18	13
Three	26	19
Four	4	3
Five	1	1
Eight	1	1
Missing	10	7
Total	100%	73

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Not surprisingly, the number of PDs that centers were reported to have had differed by center funding status. Older centers—those that were phasing down or were self-sustaining— were more likely to report that their center had had more than one PD. In these centers, 83 percent of staff from self-sustaining centers and 73 percent of staff from phasing-down centers reported that their center had had at least three PDs (figure 14).

Figure 14.—Number of PDs per center reported by center staff, by center funding status



SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Finally, center staff were asked to state their preference for the type of PD they preferred. Eighty-five percent of center staff wanted a permanent PD. Since a lack of technical expertise is also an issue revealed from the SWOT analysis, it was not surprising that 77 percent wanted a permanent PD along with a rotator as a technical expert (table 12).

Table 12.—Percentage distribution of center staff rankings regarding their preferred PD arrangement

PD arrangement	Percent				
	Most preferred or Preferred	Moderately preferred or Fairly preferred	Less preferred or Least preferred	Missing	Total
Permanent PD from ERC program	85	9	0	6	100
Permanent PD from ERC program teamed with rotator as technical expert	77	16	0	7	100
Rotator PD from ERC program	10	63	19	8	100
Permanent PD from outside ERC program	11	74	6	10	100
Rotator PD from outside ERC program	0	19	73	8	100

NOTE: Percents may not sum to 100 due to rounding.

SOURCE: National Science Foundation, Directorate for Engineering, Engineering Research Center, "SWOT Followup: Examination of ERC Program by Center Staff and Center Funding Status," 2000.

Conclusions

The following section brings together the findings above with comments from the respondents to provide an overall picture of ERC staff members' views in the areas addressed.

Education component. The SWOT analysis indicated some ERC staff members' dissatisfaction with K-12 educational outreach. SWOT participants believed that time expended to nurture the education component was costly and often resulted in reduced funding before education activities became effective. In the SWOT followup, a number of center staff suggested eliminating or reducing K-12 educational outreach programs, particularly staff at newly funded and mature centers (see tables 4 and 5).

Undergraduate education appeared to have support among SWOT analysis participants who felt that one of the strengths of the education component was enhanced education and research opportunities for such students. However, the SWOT followup responses were somewhat inconsistent

since 15 percent of center staff wanted to reduce their undergraduate education program and most were from phasing down or self-sustaining centers (see table 5).

An interesting finding is center staff interest in funding cross-disciplinary team approaches for graduate students (see tables 6 and 7). Consequently, it appears that new courses and degree programs for *graduate* students may outweigh interest in courses and degree programs for *undergraduate* students. It is also interesting that education directors out numbered other staff members in the suggestion to reduce ERC courses for undergraduates. Perhaps this interest in graduate education is related to SWOT concerns that undergraduate programs are too rigid to allow the integration of multidisciplinary courses or concerns about faculty members' willingness to participate in undergraduate courses since they receive fewer incentives for their involvement.

Research component. The SWOT analysis from the Annual Meeting suggested frustration among some center staff regarding high overhead costs (staff time and center resources) and their interference with the research program. SWOT analysis respondents noted that overhead costs associated with ERC programs tend to dilute the effectiveness of NSF funding. In the followup, over half of the respondents indicated that overhead had increased within the last 3 years, and staff at mature centers more often expressed this sentiment.[9]

When asked how they would allocate additional funding were it to become available, there was interest in prioritizing funding for research-related efforts, specifically the center's engineered systems focus and increased systems-wide work. The desire to increase the funding for centers' engineered systems work was common among industrial liaisons and administrative directors, and staff from phasing down or self-sustaining centers. Second priority for additional funding included equipment needs, graduate education, and strategic planning. It should be noted, however, that strategic planning was identified most frequently by staff at centers that are phasing down.[10] This is an interesting finding considering critiques raised in the SWOT analysis regarding the "sunset" transition from NSF ERC Program-supported centers to graduated centers; and that the most frequent weakness in ineffective PDs assigned to centers that are phasing down or self-sustaining was lack of good managerial advice. Center staff may realize the value of strategic planning as a part of their transition strategy, but do not receive much useful advice at this point in the centers' existence.

[9] Center staff from newly funded centers were excluded from the analysis since their centers have only been in existence since 1998.

[10] Of the seven respondents with interests in strategic planning as a second priority for funding, five were staff from phasing down centers.

ERC PD. SWOT analysis participants had been concerned with their PDs' length of assignment, specifically the rapid turnover of PDs that some centers had experienced. In the followup study, approximately 40 percent of center staff indicated that their center had had only one PD. However, when controlling for center funding status, the results indicate that none of the staff in phasing down and self-sustaining centers reported less than two PDs, and some reported four or more. Center staff were also asked to suggest a PD arrangement for their center. When given an array of PD options, center staff either wanted a permanent PD or a permanent PD along with a rotating technical expert, which is consistent with the SWOT analysis.

In addition to the length of assignment, SWOT analysis participants were also concerned with their PDs' managerial guidance and administrative leadership. The majority of respondents ranked their most effective PD as highly familiar with ERC goals, practices, and processes. The data also suggest that staff members' most effective PD provided sound managerial advice, while their least effective PD did not. Other characteristics of ERC PDs reported by center staff as problematic to center advancement was unfamiliarity with the relevant industry and limited technical background.

In summary, the results from the SWOT followup reveal a mixed picture of center staff concerns. While there was a stronger consensus among respondents regarding ideas about center overhead costs and NSF PDs, there was less consensus regarding their views of the importance of various center operations. In most areas studied, the age of centers seemed to be more of a factor in their priorities than the respondents' role in the center.

Appendix

National Science Foundation
ERC Program
Followup to SWOT Analysis

At last year's ERC Program Annual Meeting in Washington, D.C., meeting participants conducted a Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis of the ERC program. As a follow-up to the SWOT analysis, the ERC program management at NSF has contracted with Westat, one of the three firms that do studies about the ERC Program for NSF, to obtain some more information on several issues raised in the analysis from key staff at ERCs that received ERC program support in 1999.

We will be reporting only aggregate information to NSF. No information *attributable to an individual or an individual center* will be shared with NSF. We hope to have our final report to the ERC program management by late winter/early spring 2000.

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1. Please state your center affiliation and title, e.g., Director, Industrial Liaison Officer, Education Program Director. In addition, please indicate how long you've been with the center and describe your operational responsibilities.

Center _____

Title _____

Number of years with center _____

Description _____

2. If you were asked to pare down one or more center operations in order to enable the center to focus more effectively on its core ERC mission, which ONE of the following would you recommend be **eliminated**, and which ONE of the following would you recommend be **reduced** in scope. Assume that NSF reporting requirements remain the same. *Please left double-click on the relevant boxes.*

	Eliminate	**Reduce**
A. Research		
Engineered systems focus	☐1	☐1
Strategic planning	☐2	☐2
Cross-disciplinary team approach to research for graduate students	☐3	☐3
Cross-disciplinary team approach to research for undergraduate students	☐4	☐4
Outreach in research to other researchers outside ERC institution(s)	☐5	☐5
Outside Scientific Advisory Boards	☐6	☐6
B. Education		
Maintaining or creating ERC research-related courses/degree programs for *undergraduates*.	☐1	☐1
Maintaining or creating ERC research-related courses/degree programs for *graduate* students	☐2	☐2
Educational outreach to undergraduate and graduate students (e.g., REUs, CREST, etc.)	☐3	☐3
Educational outreach to K-12 students	☐4	☐4
Development of courses for practitioners	☐5	☐5
C. Industry		
Two meetings with the IAB each year	☐1	☐1
One of the two meetings with the IAB each year	☐2	☐2
Internships for students in industry	☐3	☐3
Industrial Liaison Officer position	☐4	☐4
Workshops with industry	☐5	☐5

2. (continued)

	Eliminate	Reduce
D. Administration		
Administrative manager	☐1	☐1
Staff	☐2	☐2
Other (*specify*) _____	☐3	☐3
E. Other		
Other activity not required by the ERC program (*specify*) _____	☐4	☐4

3. Assume that your center's base funding increases by 25 percent. Please indicate which area would have first priority for increased funds and which would have second priority. *Please left double-click on the relevant boxes.*

	Priority 1st	Priority 2nd
A. Research		
Engineered systems focus	☐1	☐1
Strategic planning	☐2	☐2
Equipment	☐3	☐3
Increased systems-wide work	☐4	☐4
Cross-disciplinary team approach to research for graduate students	☐5	☐5
Cross-disciplinary team approach to research for undergraduate students	☐6	☐6
Outreach in research to other researchers outside ERC institution(s)	☐7	☐7
Outside Scientific Advisory Boards	☐8	☐8
B. Education		
Maintaining or creating ERC research-related courses/degree programs for *undergraduates*.	☐1	☐1
Maintaining or creating ERC research-related courses/degree programs for *graduate* students	☐2	☐2
Educational outreach to undergraduate and graduate students (e.g., REUs, CREST, etc.)	☐3	☐3
Educational outreach to K-12 students	☐4	☐4
Development of courses for practitioners	☐5	☐5
C. Industry		
Two meetings with the IAB each year	☐1	☐2
One of the two meetings with the IAB each year	☐2	☐2
Internships for students in industry	☐3	☐3
Industrial Liaison Officer position	☐4	☐4
Workshops with industry	☐5	☐5
D. Administration		
Administrative manager	☐1	☐2
Staff	☐2	☐2
Other (*specify*) _____	☐3	☐3
E. Other		
Other activity not required by the ERC program (*specify*) _____	☐1	☐1

Several sections of the SWOT report included complaints about ERCs' "overhead" costs. For example: "ERC overhead has several drawbacks: (1) too many time-sinks (reports, trips to DC, meetings) reduce the time available for research; (2) the time and money spent on administration subtracts from research resources; and (3) it makes it hard to compete for best (and well-funded) faculty attention." Additional quotations include: "Reduce the overhead on faculty/students" and "Unattractive funding characterized by the high overhead, too few dollars per faculty member..."

The following three questions pertain to your center's overhead costs other than what is accounted for in your university's modified indirect cost rate that NSF reimburses in each award.

4. Please describe what you consider "overhead" in the context of your center.

5. Based on your knowledge, which of the following best describes what has happened to overhead in your center within the past three years. *(Check one.)*

a. Gone up ..... ☐1
b. Stayed the same ..... ☐2
c. Gone down..... ☐3

6. If overhead has gone up, how, if at all, has the increase in overhead costs interfered with center operations?

The remaining questions pertain to NSF Program Directors (PDs) with responsibility for specific ERCs. For questions 7 and 8: If you can only evaluate one PD because you have either only known one PD or your center has only had one PD, please do not answer both questions.

7. Looking across the following five characteristics of a PD, please rate the **MOST** effective PD your center has had along each characteristic, where 1 = Strong, 2 = Adequate, 3 = Weak, and 8 = Don't know. ***(If you are only evaluating one PD and you answered this question, please skip question 8.)***

	Strong 1	**Adequate 2**	**Weak 3**	**Don't know 8**
a. Familiarity with the interests, needs, and constraints of the relevant industry sector(s)	☐1	☐2	☐3	☐8
b. Close proximity of the PD's technical background to the center's technical area(s)	☐1	☐2	☐3	☐8
c. Familiarity with ERC program goals, practices, and processes, e.g., ERC site visits	☐1	☐2	☐3	☐8
d. Provides sound managerial advice	☐1	☐2	☐3	☐8
e. Other (*specify*) _____	☐1	☐2	☐3	☐8

8. Using the same list of PD characteristics, please rate the **LEAST** effective PD your center has had along each characteristic, where 1 = Strong, 2 = Adequate, 3= Weak, and 8 = Don't know. ***(If you are only evaluating one PD and you answered this question, please skip question 7.)***

	Strong 1	Adequate 2	Weak 3	Don't know 8
a. Familiarity with the interests, needs, and constraints of the relevant industry sector(s)	☐1	☐2	☐3	☐8
b. Close proximity of the PD's technical background to the center's technical area(s)	☐1	☐2	☐3	☐8
c. Familiarity with ERC Program goals, practices, and processes, e.g., ERC site visits	☐1	☐2	☐3	☐8
d. Provides sound managerial advice	☐1	☐2	☐3	☐8
e. Other (*specify*) _____	☐1	☐2	☐3	☐8

9. Using the same list of PD characteristics, please rank their importance to you, from 1 to 5, where 1 means most important and 5 means least important.

	Most important 1	2	3	4	Least important 5
a. Familiarity with the interests, needs, and constraints of the relevant industry sector(s)	☐1	☐2	☐3	☐4	☐5
b. Close proximity of the PD's technical background to the center's technical area(s)	☐1	☐2	☐3	☐4	☐5
c. Familiarity with ERC program goals, practices, and processes, e.g., ERC site visits	☐1	☐2	☐3	☐4	☐5
d. Provides sound managerial advice	☐1	☐2	☐3	☐4	☐5
e. Other (*specify*) _____	☐1	☐2	☐3	☐4	☐5

10. Looking at the involvement of your present PD in your center over the last year, please indicate the appropriateness of the *amount of contact* he/she has had with your center based on your own knowledge, where 1 = Too little, 2 = Appropriate, 3 = Too much, and 8 = Don't know.

	Involvement: Too little 1	Appropriate 2	Too much 3	Don't know 8
a. Attendance at IAB meetings	☐1	☐2	☐3	☐8
b. Contact with center staff between site visits	☐1	☐2	☐3	☐8
c. Familiarity with the center's progress between site visits	☐1	☐2	☐3	☐8
d. Management guidance	☐1	☐2	☐3	☐8
e. Site visit preparation guidance	☐1	☐2	☐3	☐8
f. Technical guidance	☐1	☐2	☐3	☐8

11a. How many PDs has your center had? _____ PDs or ☐8 Don't know

11b. How long has the present PD been working with your center? _____ Years or ☐8 Don't know

12. If your present PD has developed a team of other NSF PDs to work with your center, how has this affected the center?

13. Assume you can choose the PD arrangement for your center. Please rank the following options from 1 to 6, with 1 as your most preferred arrangement and 6 as your least preferred).

		Most pre-ferred 1	**2**	**3**	**4**	**5**	**Least pre-ferred 6**
a.	A permanent PD (permanent NSF employee) from the ERC program	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]	☐[6]
b.	A "rotator" PD (a person who stays at NSF for 1-2 years) from the ERC program	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]	☐[6]
c.	A permanent PD from the ERC program teamed with a rotator from another NSF division serving as a technical expert	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]	☐[6]
d.	A permanent PD from outside of the ERC program's division	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]	☐[6]
e.	A "rotator" PD from outside the ERC program's division	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]	☐[6]
f.	Other (*specify*) _____	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]	☐[6]

14. Please use the space provided to share any additional comments about the role of ERC PD.