

*National Science Foundation  
Industry/University  
Cooperative Research Centers*



*FINAL*

*August 2019*

*2017-2018 Process Outcome Survey Results*

*Descriptive Statistics Compiled from  
Industry, Faculty & Student Surveys*

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## CONTENTS

### Overview

Report Processing & Data Issues	2
Response Rates for Industry Surveys	3
Response Rates for Faculty and Student Surveys	3
Long Faculty Form vs. Short Faculty Form	3

### Industry Results

#### **Pulse Survey**

Table 1. Satisfaction	4
Table 2. Areas for Improvement	4
Table 3. Renewal Intentions	4
Table 4. Member Descriptors	5

#### **Benefits Inventory**

Part 1: Networking Benefits	
Table 4. New Connections & Partnerships	5
Table 5. Students Hired	5
Part 2: Research & Development Benefits	
Table 6. Research Relevance	6
Table 7. Impact on Member Research & Development	6
Part 3: Technology Translation Benefits	
Table 8. Technology & Knowledge Transfer	7
Table 9. Commercial & Financial Benefits	7
Part 4: Member Information	
Table 10. Member Descriptors	8

### Faculty Results

Table 1: Research	9
Table 2: Impact	9
Table 3: Commitment	10
Table 4: Satisfaction	10
Table 5: Areas for Improvement	10

### Student Results

Table 1: Satisfaction	11
Table 2: Comparative Evaluation	11

## **REPORT PROCESSING & DATA ISSUES**

This report provides descriptive statistics on the IUCRC Process Outcome Questionnaires. Data were collected during the fall of 2018 and spring 2019 and refer to the Center activity for FY 2017-2018.

Since most evaluators use this report to benchmark their Center compared to a program-wide “norm”, we have reported “Center-level” means and standard deviations. That is, means (unweighted) for each center were used to calculate a Center-level mean. For forced choice questions, frequencies for individual respondents were also reported.

### ***Industry Questionnaires***

Starting in FY2017 year, data were collected using two industry surveys; A Pulse Survey and Benefits Inventory, administered at alternate semi-annual Center IAB meetings. See the IUCRC Evaluation project website for current and past versions of the surveys (<http://www.ncsu.edu/iucrc/ResourcesForEvaluators.htm#Surveys>).

### ***Faculty Questionnaires***

The faculty questionnaire includes two versions: a long version (13 items) that is used by centers during the first phase (in year 1-5) and a short version (6 items) that is used by centers during the second and third phase (in year 6-15) of NSF funding. Since both the faculty long and faculty short questionnaires share some of the same questions, data for these shared questions were pooled for analysis. In the tables below, questions only included in the long version are noted as follows: (L).

### ***Student Questionnaires***

The student questionnaire was implemented as a required instrument towards the end of FY2016.

## RESPONSE RATES

### Industry

Category	Center Level		Member Level	
	Pulse	Benefits	Pulse	Benefits
<b>Response Frequency</b>				
Continuing Population from CD report <sup>1</sup>	68	68	1164	1164
1 <sup>st</sup> Year Reporting Population from CD report <sup>2</sup>	+6	+0	+39	+0
NCE/Retired/Defunct Centers	11	11	140	140
NCE/Retired/Defunct Centers Reporting <sup>3</sup>	+4	+4	+73	+73
Population <sup>4</sup>	67	61	1136	1097
Centers That Did Not Return Data <sup>5</sup>	11	7	160	131
Available Population <sup>6</sup>	56	54	976	966
Data Received	56	54	413	357
Received/ Population	83.58%	88.52%	36.36%	32.54%
Received/ Available Population	100%	100%	42.32%	36.96%

### Faculty and Students

Category	Center Level		Individual Level	
	Faculty	Students	Faculty	Students
<b>Response Frequency</b>				
Continuing Population from CD report	68	68	907	1256
1 <sup>st</sup> Year Reporting Population from CD report	+1	+0	+1	+0
NCE/Retired/Defunct Centers	11	11	112	123
NCE/Retired/Defunct Centers Reporting <sup>3</sup>	+2	+0	+19	+0
Population <sup>4</sup>	60	57	815	1133
Centers That Did Not Return Data <sup>5</sup>	10	39	126	762
Available Population <sup>6</sup>	50	18	689	371
Data Received	50	18	326	159
Received/ Population	83.33%	31.58%	38.00%	14.03%
Received/ Available Population	100%	100%	47.32%	42.86%

## LONG FACULTY FORM VS. SHORT FACULTY FORM

	Long Form	Short Form
<b># of items</b>	13	6
<b># of questions in common</b>	6	6
<b># of unique questions</b>	7	0
<b># of Centers using form</b>	17	17
<b>Sample size</b>	141	185

<sup>1</sup> Individual-level numbers for Pulse, Benefits and Faculty surveys are different from 2017-2018 CD report because they include 2016-2017 numbers for Grid-Connected Advanced Power Electronic Systems. The CD data for this center was not collected for 2017-2018 report due to a new reporting schedule.

<sup>2</sup> 1st Year Reporting Population from CD report includes numbers from Wind Hazard and Infrastructure Performance which as not listed in FY2017-2018 CD report because it was launched after the end of that fiscal year.

<sup>3</sup> Retired/defunct Centers and Centers on no-cost extension (NCE) are not required to submit data, but some do. If so, those data were included in the analysis.

<sup>4</sup> Population was defined as centers that were at least 1 year old.

<sup>5</sup> Centers were excused for reasons such as being in the midst of center restructuring, high respondent turnover, and respondent refusal to complete surveys.

<sup>6</sup> Numbers based on population minus excused and not returned counts.

# Industry Results: 2017-2018

## *Pulse Survey*

**Table 1. Satisfaction**

1. Please rate your level of satisfaction with the following:

	<b>Individual Frequencies</b>										<b>Center Level</b>		
	Not Satisfied (1)		Slightly Satisfied (2)		Somewhat satisfied (3)		Quite Satisfied (4)		Very Satisfied (5)		Missing Data	Mean	S.D.
	N	%	N	%	N	%	N	%	N	%			
a. Center Research	0	0.0	2	0.5	40	9.7	193	46.8	177	43.0	1	4.30	0.43
b. Center Administration	0	0.0	2	0.5	34	8.2	143	34.6	234	56.7	0	4.43	0.43
c. Center Meetings	1	0.2	4	1.0	30	7.3	198	47.9	180	43.6	0	4.32	0.37

**Table 2. Areas for Improvement**

3. How can the Center improve? Please mark areas that need improvement.

	<b>Individual Frequencies</b>	
	N of Responses	% of Respondents <sup>^</sup>
a. Planning the Research Program	51	12.3
b. Project Selection	65	15.7
c. Project Development and Management	50	12.1
d. Project Results Reporting	98	23.7
e. Dissemination of Results via Publications	56	13.6
f. Technology Transfer	81	19.6
g. Intellectual Property Management	37	9.0
h. Fundraising & Recruiting New Members	97	23.5
i. IAB Meetings	36	8.7
j. Communication	71	17.2
k. Center Personnel	5	1.2
l. Other	37	9.0

*“On the one hand, I like the 20 minutes per project updates, since that forces the story to be punchy and to the point. On the other, a pre-read or some other form of written communication with some more data or detail prior to the meeting would also be good, as some of the details are missed.”*

*“Need to figure out a strategy to bring in new members to increase to research funding pools and to provide more diversity of opinions”*

<sup>^</sup> Respondents were encouraged to check as many boxes as applied. Therefore, the percentage across all items may total to greater than 100%.

**Table 3. Renewal Intentions**

5. Will your organization renew its membership?\*

	<b>Individual Frequencies</b>										<b>Center Level</b>		
	Definitely Not (1)		Probably Not (2)		Uncertain (3)		Probably Yes (4)		Definitely Yes (5)		Missing Data	Mean	S.D.
	N	%	N	%	N	%	N	%	N	%			
	0	0.0	3	0.8	32	8.0	197	49.5	166	41.7	15	4.30	0.41

**Table 4. Member Descriptors**

6. How many years has your organization been a member in this center?

<b>Member Level</b>				<b>Center Level</b>			
Mean		S.D.		Mean		S.D.	
3.82		3.43		4.02		2.75	

  

7. Organization Type/Size

	<b>Individual Frequencies</b>	
	N	%
1. For-Profit Large (> 500 Employees)	229	58.0
2. For-Profit Small (11- 500 Employees)	61	15.4
3. For Profit-Micro (< 10 Employees)	18	4.6
4. Government (Federal/State/Local)	58	14.7
5. Non-Profit / Other	29	7.3
Total Reported	395	100.0

# Benefits Inventory

## Part 1: Networking Benefits

**Table 4. New Connections & Partnerships**

1. Please indicate which of the following networking benefits listed below, if any, were realized by your organization, during the current membership year.

	<b>Member Level</b>		<b>Center Level</b>	
	<b>N</b>	<b>%</b>	<b>Mean %</b>	<b>S.D.</b>
In the current membership year, has your organization established any new, valuable connections with other Center participants (industry, government, faculty, students, others)?	310	86.8	86.51	15.15

2. In the current membership year, has your organization started to explore or initiated a partnership with any of the following individuals or groups, as a result of your involvement in the center? Check all that apply.

	<b>Member Level</b>		<b>Center Level</b>	
	<b>N</b>	<b>%</b>	<b>Mean %</b>	<b>S.D.</b>
a. Developed partnerships with other IAB members (e.g., research partnership, collaboration, joint investment)	109	30.5	34.23	26.86
b. Developed partnerships with university faculty or research scientists (e.g., one-to-one research contract, collaboration on a grant, consulting)	212	59.4	60.40	22.63
c-1. Hired any students working on center research projects as a full-time employee, contractor, or intern.	71	19.9	22.99	22.44
d. Other	19	5.3	4.78	7.50
e. None of these	79	22.1	21.08	20.05

**Table 5. Students Hired <sup>^</sup>**

2c-2. If “yes” to “Hired any students working on center research projects as a full-time employee, contractor, or intern.” How many students hired? *Sample: N of members = 356; N of centers = 54*

<b>Member Level Scores</b>	<b>Member Level</b>	
	<b>Mean</b>	<b>S.D.</b>
Number of students hired per respondent organization	0.29	0.72
<b>Center Level Scores</b>	<b>Center Level</b>	
Number of students hired per respondent organization per center	0.35	0.45
Number of students hired by respondent organizations per center	1.93	2.21
<b>Program Level Scores</b>	<b>Program Level</b>	
Total number of students hired by respondent organizations	128	

<sup>^</sup> Member and center level statistics exclude one outlier that reported 25 student interns hired. Those 25 interns are included in the program level total.

3. How have these new connections and partnerships benefited your organization (e.g., new business opportunities, access to resources or information, enhanced research capability, etc.)? (quotes)

*“The ability to access experts in the field has been greatly beneficial to our organization. Leveraging the research faculty for technical questions and discussions helps to give confidence to our management about the decisions we are making.”*

*“The connections afforded by the center enabled the organization to hire new employees with strong research experience and technical background.”*

*“Led to new potential sales opportunities at accounts we either could not penetrate or did not know had a need for our products.”*

*“Making progress to starting a new company to implement a solution based on the research from a partnership formed with a university partner.”*

*“The center is important in maintaining and supporting EXISTING connections and partnerships.”*

## *Part 2: Research & Development Benefits*

**Table 6. Research Relevance**

4. Please indicate the R&D benefits your organization has received from access to Center research, by estimating what percentage of the projects funded during the current membership year, fall into each of the following categories (Total must sum to 100%):

	<b>Member Level</b>		<b>Center Level</b>	
	<b>Mean %</b>	<b>S.D.</b>	<b>Mean %</b>	<b>S.D.</b>
a. <u>Not Relevant Research</u> : % of projects that are probably not relevant to your organization's current or future needs	28.25	24.61	27.68	14.65
b. <u>Adjacent Research</u> : % of projects that are potentially relevant to your organization's current or future needs, but in an area that is outside your organization's current focus	26.94	18.81	26.72	9.33
c. <u>Core Research</u> : % of projects so relevant to your organization's current or future needs that your organization would almost certainly have conducted or contracted out a similar project within the next couple years	27.26	21.98	28.29	16.58
d. <u>Transformational Research</u> : % of projects that are potentially relevant to your organization's current or future needs, but too risky/blue sky for internal investment	14.19	15.64	14.28	9.06

**Table 7. Impact on Member Research & Development**

5. Consider the center's research portfolio and specifically the projects in which your organization is most interested. In which of these ways, if any, have the center's research findings and outputs (including those from this year and any prior years) affected your organization's internal R&D in the current membership year? Check all that apply.

	<b>Member Level</b>		<b>Center Level</b>	
	<b>N</b>	<b>%</b>	<b>Mean %</b>	<b>S.D.</b>
a. Helped accelerate the pace and/or completion of some R&D projects now underway at (or contracted by) your organization	146	40.9	40.20	24.80
b. Helped your organization decide against starting one or more new R&D projects that otherwise would have been initiated	104	29.1	30.10	26.28
c. Triggered development of new R&D projects, or significantly redirected pending projects within your organization	131	36.7	37.08	24.99
d. Helped advanced the Technology Readiness Level of technology being developed within your organization	141	39.5	44.46	29.14
e. None of these	56	15.7	14.80	19.75

6. Thinking about the R&D benefits experienced by your organization, what has been the most important or significant impact? Please describe. If possible, provide a quantifiable measure of the economic value of that benefit (e.g., time saved, \$ saved, \$ invested, etc.).

*“The R & D benefits experienced directly and indirectly through funding and collaborations, the value has been cutting edge technology results that would have cost 10 times the amount put into this research, not to mention the benefits of society/humankind in which the specific results contribute.”*

*“Time to market. With the center research and technology, we were able to deploy a solution with 18 months of project conception to production.”*

*“Could potentially help us monetize several million dollars of R&D already spent, by increasing the value with addition improvement.”*

*“The most important impact of the center work has been in accelerating R&D at my institution by laying the ground work or clearly showing wrong or incorrect research pathways.”*

*“Through multiple projects aligned to our research needs, we are able to explore novel new high risk and high reward research which have changed our research path.”*

### Part 3: Technology Translation Benefits

**Table 8. Technology & Knowledge Transfer**

7. During the current membership year, has your organization realized any technology or knowledge transfer benefits related to your participation in the Center? Check all that apply.

	Member Level		Center Level	
	N	%	Mean	S.D.
a. Accessed capabilities and insights (e.g., center facilities, equipment, faculty or student capabilities, insights from other members, etc.) to which your firm would not otherwise have access	203	56.9	54.57	27.01
b. Licensed center's IP	19	5.3	4.04	11.05
c. Produce your own IP related to research at the center	21	5.9	5.30	10.65
d. Helped your org. identify new applications for technology trying to develop	161	45.1	45.77	27.65
e. Helped your org. anticipate or address some regulatory issues in your industry	58	16.2	15.31	19.96
f. None of these	58	16.3	18.35	22.38

**Table 9. Commercial & Financial Benefits**

8a. During the current membership year, has your organization realized any commercial or financial benefit that involved the translation of the center's current or prior years' research findings and outputs? Check all that apply.

	Member Level		Center Level	
	N	%	Mean %	S.D.
a1. Launch new products or services based on what you learned from the center	25	7.0	7.36	12.81
a2. Improve existing products or services based on what you learned from the center	80	22.4	21.17	19.61
a3. Improve operational or manufacturing processes based on what you learned from the center	51	14.3	13.76	17.16
a4. None of these	214	59.9	62.31	26.02

8b. [If yes to any] Would these commercial or financial benefits have been realized in the absence of the center?

Individual Frequencies								Center Level		
No, the center played a critical role in realizing these benefits (1)		Yes, but the benefits would have been delayed without the center's involvement (2)		Yes, the center had only limited influence on our ability to realize these benefits (3)		N/A		Missing Data	Mean %	S.D.
N	%	N	%	N	%	N	%	N		
23	19.0	82	67.8	16	13.2	236	66.1	0	1.93	0.46

	Member Level		Center Level	
	N	%	Mean %	S.D.
9. Have any of these technology translation-related benefits contributed to the addition of new jobs at your organization?	69	19.3	21.17	23.38

10. Thinking about the technology translation benefits experienced by your organization, what has been the most important or significant impact? Please describe. If possible, provide a quantifiable measure of the economic value of that benefit (e.g., \$s saved, time saved, waste/scrap reduced, etc.).

*"Keeping informed on the latest state of numerous technologies that we may incorporate in future products. This is one mechanism for us to spread out the research risks and invest in focused areas."*

*"We have licensed [center] technology at the member rate, which we believe will save \$35,000 + in fees."*

*"Utilizing pre-competitive Center results toward evaluating technology feasibility; leveraging student skill sets to attempt hand-over of bench testing capabilities in-house."*

*"The most important benefit to us is that the center helped to analyze and develop new product features where we don't have the financial and technical resources to engage in. We therefore save R&D dollars for about 1-2 engineers from the technology translation."*



## *Part 4: Member Information*

**Table 10. Member Descriptors**

12. How many years has your organization been a member in this center?			
<b>Member Level</b>		<b>Center Level</b>	
<b>Mean</b>	<b>S.D.</b>	<b>Mean</b>	<b>S.D.</b>
4.67	4.12	4.85	2.67

  

13. Organization Type/Size		
	<b>Individual Frequencies</b>	
	<b>N</b>	<b>%</b>
1. For-Profit Large (> 500 Employees)	200	57.1
2. For-Profit Small (11- 500 Employees)	63	18.0
3. For Profit-Micro (< 10 Employees)	25	7.1
4. Government (Federal/State/Local)	41	11.7
5. Non-Profit / Other	21	5.9
Total Reported	350	100.0

# Faculty Results: 2017-2018

**Table 1. Research**

1. Compared to the research projects that you typically conduct outside the Center, would you describe your Center funded research as: (L)\*

<b>Individual Frequencies</b>											<b>Center Level</b>	
Much more basic (1)		More basic (2)		Same (3)		More Applied (4)		Much more applied (5)		Missing Data	Mean	S.D.
N	%	N	%	N	%	N	%	N	%	N		
0	0.0	3	2.1	47	33.6	75	53.6	15	10.7	1	3.79	0.31

\* Indicates a question that is unique to the long version of the faculty questionnaire.

2. During the past year, how satisfied were you with the following?

	<b>Individual Level</b>											<b>Center Level</b>	
	Not Satisfied (1)		Slightly Satisfied (2)		Somewhat Satisfied (3)		Quite Satisfied (4)		Very Satisfied (5)		Missing Data	Mean	S.D.
	N	%	N	%	N	%	N	%	N	%	N		
a. Quality of the Center-supported research program	0	0	2	1.4	11	7.8	53	37.6	75	53.2	0	4.39	0.47
b. Relevance of the Center's research program to my professional goals	0	0	3	2.1	15	10.6	43	30.5	80	56.7	0	4.43	0.46

**Table 2. Impact**

4. During the past year, what impact has participation in the Center had for YOU in the following areas? (L)\*

	<b>Individual Level</b>											<b>Center Level</b>	
	No Impact (1)		Somewhat Positive Impact (2)		Moderately Positive Impact (3)		Very Positive Impact (4)		Extremely Positive Impact (5)		Missing Data	Mean	S.D.
	N	%	N	%	N	%	N	%	N	%	N		
a. The feeling of accomplishment I get from the research I do.	2	1.4	5	3.6	21	15.0	66	47.1	46	32.9	1	4.00	0.69
b. Opportunities for research contracts/grants.	2	1.4	12	8.5	18	12.8	51	36.2	58	41.1	0	3.97	0.82
c. Recognition I receive for the work I do.	3	2.1	12	8.6	29	20.7	56	40.0	40	28.6	1	3.71	0.89
d. Access to useful equipment.	34	24.3	12	8.6	27	19.3	31	22.1	36	25.7	1	3.18	1.15
e. Ability to support graduate students.	10	7.2	11	7.9	17	12.2	44	31.7	57	41.0	2	3.92	0.75
f. Ability to publish my work in quality proceedings and journals.	10	7.1	10	7.1	28	20.0	46	32.9	46	32.9	1	3.70	0.94

\* Indicates a question that is unique to the long version of the faculty questionnaire.

**Table 3. Commitment**

5. Which option best expresses your current intentions?													
	<b>Individual Frequencies</b>										<b>Center Level</b>		
	Definitely Not		Probably Not		Uncertain		Probably Yes		Definitely Yes		Missing Data	Mean	S.D.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)					
N	%	N	%	N	%	N	%	N	%	N			
Next year I will submit my best research ideas in a center funded proposal	1	0.7	7	5.0	15	10.6	47	33.3	71	50.4	0	4.33	0.48

**Table 4. Satisfaction**

6. During the past year, how satisfied were you with center administrative operations?													
	<b>Individual Frequencies</b>										<b>Center Level</b>		
	Not Satisfied		Slightly Satisfied		Somewhat Satisfied		Quite Satisfied		Very Satisfied		Missing Data	Mean	S.D.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)					
N	%	N	%	N	%	N	%	N	%	N			
	2	1.4	2	1.4	11	7.9	41	29.3	84	60.0	1	4.40	0.64

**Table 5. Areas for Improvement**

7. How can the Center improve? Please mark areas that need improvement.		
	<b>Individual Frequencies</b>	
	<b>N of Responses</b>	<b>% of Respondents<sup>^</sup></b>
a. Communication	36	25.5
b. Planning & development of research program	26	18.4
c. Management of projects	14	9.9
d. Project selection	15	10.6
e. Proposals & publications	12	8.5
f. Technology transfer	17	12.1
g. Intellectual property	14	9.9
h. Fundraising	38	27.0
i. Other	11	7.8

<sup>^</sup> Respondents were encouraged to check as many boxes as applied. Therefore, the percentage across all items may total to greater than 100%.

# Student Results: 2017-2018

**Table 1. Satisfaction**

1. How satisfied are you with the following features of the center?

	<u>Individual Frequencies</u>									<u>Center Level</u>	
	Not at all Satisfied (1)		Moderately Satisfied (2)		A Great Deal Satisfied (3)		Completely Satisfied (4)		Missing Data	Mean	S.D.
	N	%	N	%	N	%	N	%			
a. Technical quality of research	1	0.6	7	4.5	55	35.0	94	59.9	2	3.46	0.37
b. Communications between students and industrial scientist	2	1.3	25	16.2	57	37.0	70	45.5	5	3.20	0.43
c. Communications between students and faculty	0	0.0	9	5.7	36	22.8	113	71.5	1	3.62	0.25
d. Communication among the students	2	1.3	25	16.4	44	28.9	81	53.3	7	3.33	0.32
e. Opportunity to learn about research in industrial settings	6	3.8	20	12.7	61	38.9	70	44.6	2	3.21	0.26
f. Opportunity to participate in applied research	3	1.9	10	6.3	51	32.1	95	59.7	0	3.45	0.29

**Table 2. Comparative Evaluation**

2. Comparing your work in the center with other faculty projects you have participated in, how satisfied are you?

	<u>Individual Frequencies</u>									<u>Center Level</u>	
	Compares Unfavorably (1)		About the Same (2)		Compares Favorably (3)		NA (9)		Missing Data	Mean	S.D.
	N	%	N	%	N	%	N	%			
a. Technical quality of research	3	1.9	59	37.8	82	52.6	12	7.7	3	2.54	0.27
b. Communications between students and industrial scientist	7	4.6	48	31.6	86	56.6	11	7.2	7	2.47	0.37
c. Communications between students and faculty	6	4.0	62	41.1	74	49.0	9	6.0	8	2.44	0.23
d. Communication among the students	7	4.9	65	45.1	61	42.4	11	7.6	15	2.37	0.29
e. Opportunity to learn about research in industrial settings	7	4.6	38	25.0	94	61.8	13	8.6	7	2.57	0.34
f. Opportunity to participate in applied research	3	2.0	47	31.1	91	60.3	10	6.6	8	2.60	0.25