



Industry/University  
Cooperative Research  
Centers

# **Highlights of Process/Outcome Data**

**FY 2012-2013**

IUCRC Evaluator's Meeting

June 6, 2014

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North Carolina State University



# Overview

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- Response rate
- Industry Findings
- Faculty Findings
- Industry's Economic Impact Findings

# Process/Outcome

## 2012-2013 Response Rates

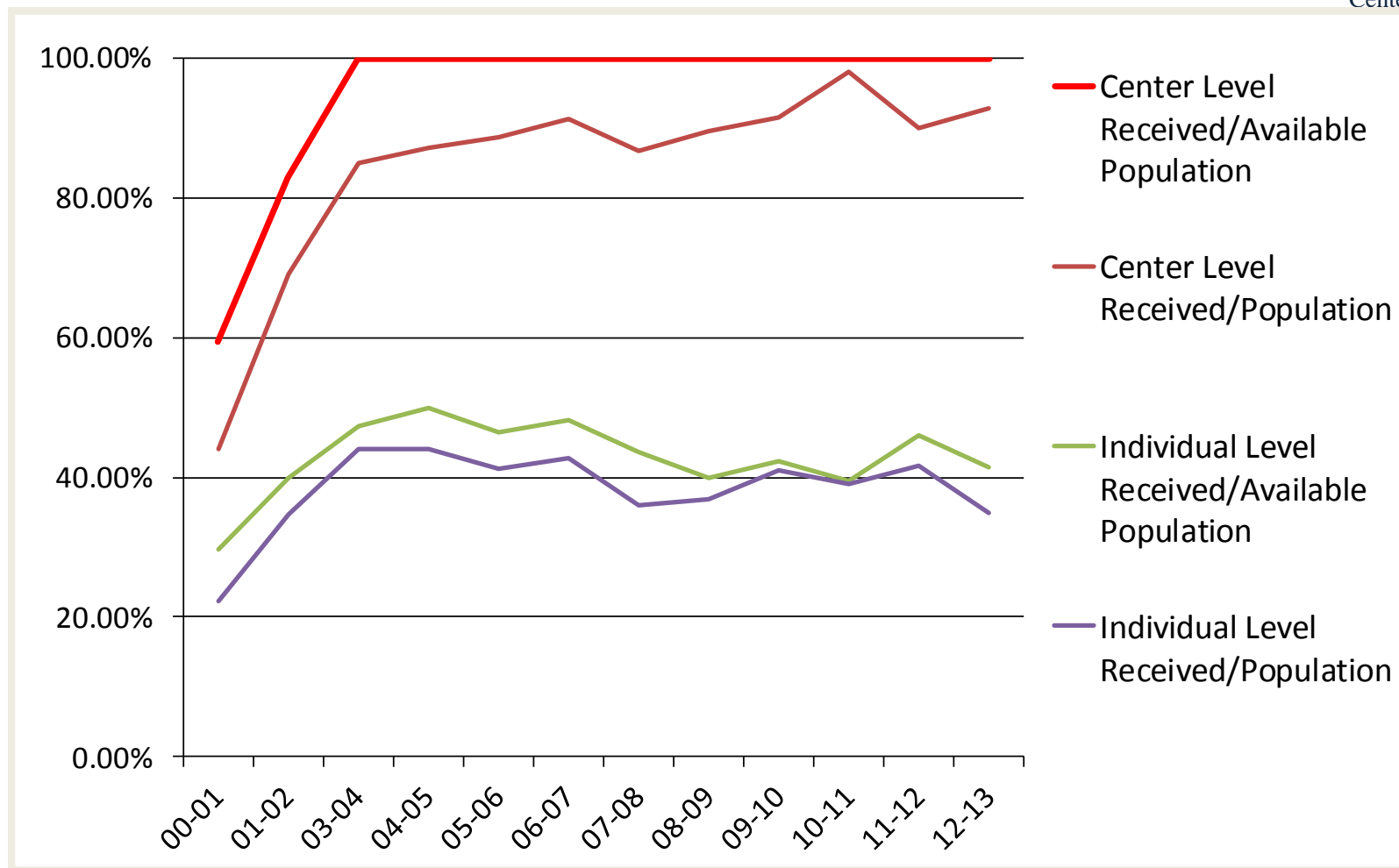


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Category	Center Level		Individual Level	
	Industry	Faculty	Industry	Faculty
<b><i>Response Frequency</i></b>				
Continuing Population from CD report	60	60	1102	978
1 <sup>st</sup> Year Reporting Population from CD report	+0	+0	+0	+0
Retired/Defunct Centers <sup>a</sup>	1	1	4	11
Retired/Defunct Centers Reporting <sup>b</sup>	+0	+0	+0	+0
Phase III Centers Exempt	4	4	67	100
Phase III Centers Reporting <sup>c</sup>	+2	+2	+19	+24
Population <sup>d</sup>	57	57	1050	891
Centers Excused from Evaluation <sup>e</sup>	6	6	119	138
Centers that did not return data	0	11	0	155
Available Population	51	40	931	598
Data Received	51	40	385	297
Received / Population	89.47%	70.18%	36.67%	33.33%
Received / Available Population	100%	100%	41.35%	49.67%



# Industry Response Rate



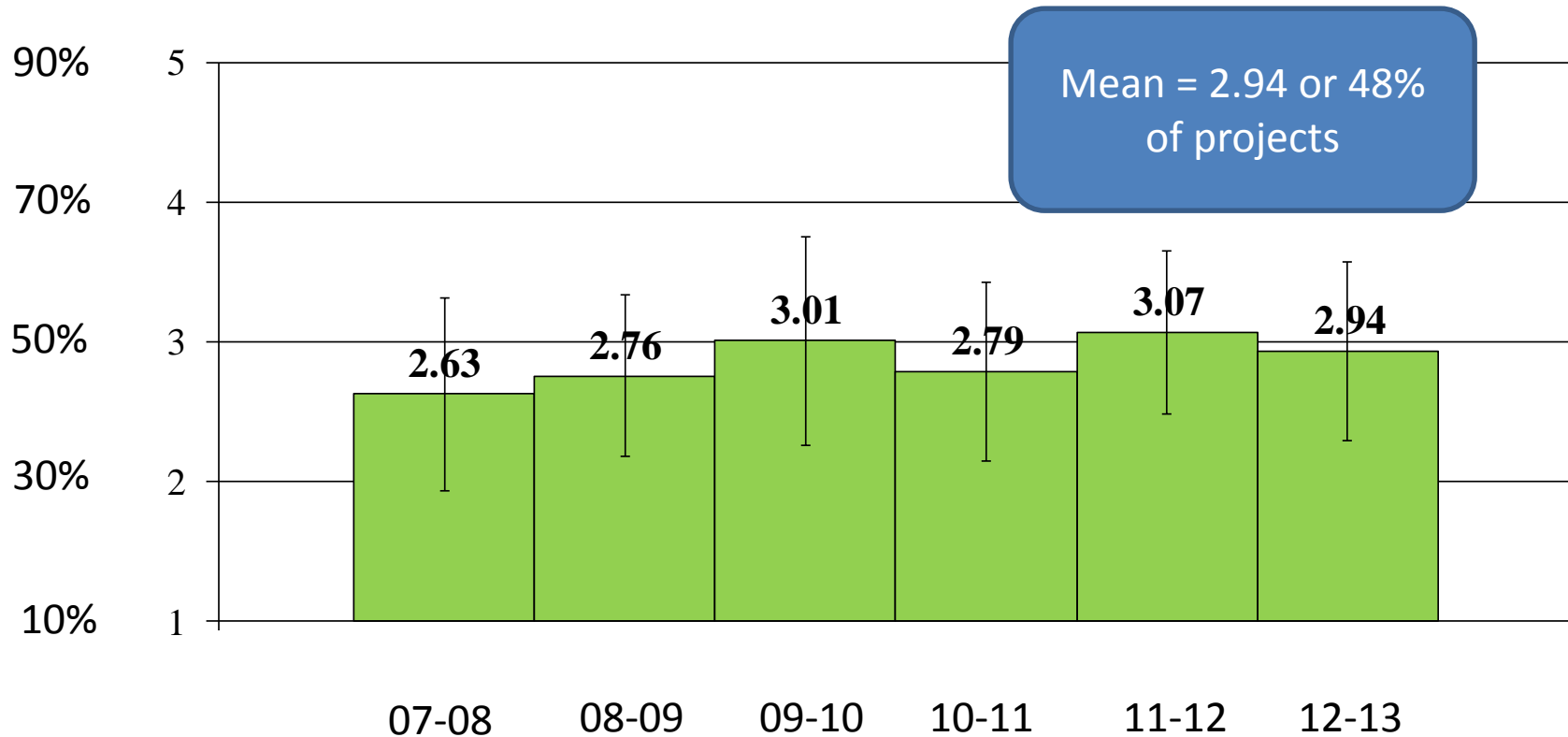


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# Industry Questionnaire

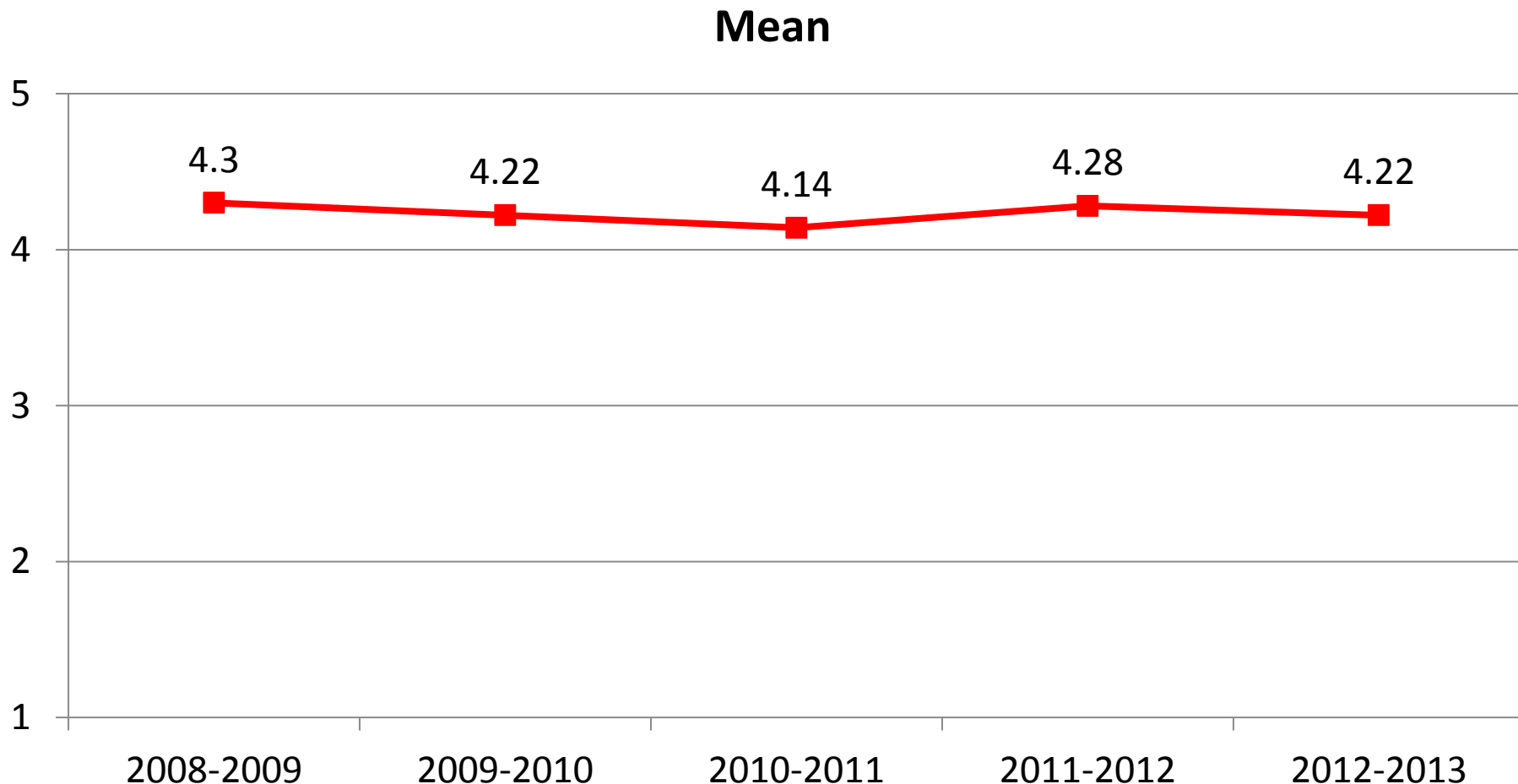
Select Results

# Q1a: What percentage of the Center's currently funded research projects do you consider relevant to your organization's current or future R&D needs?\*



percentage values on y-axis represent midpoint of response range

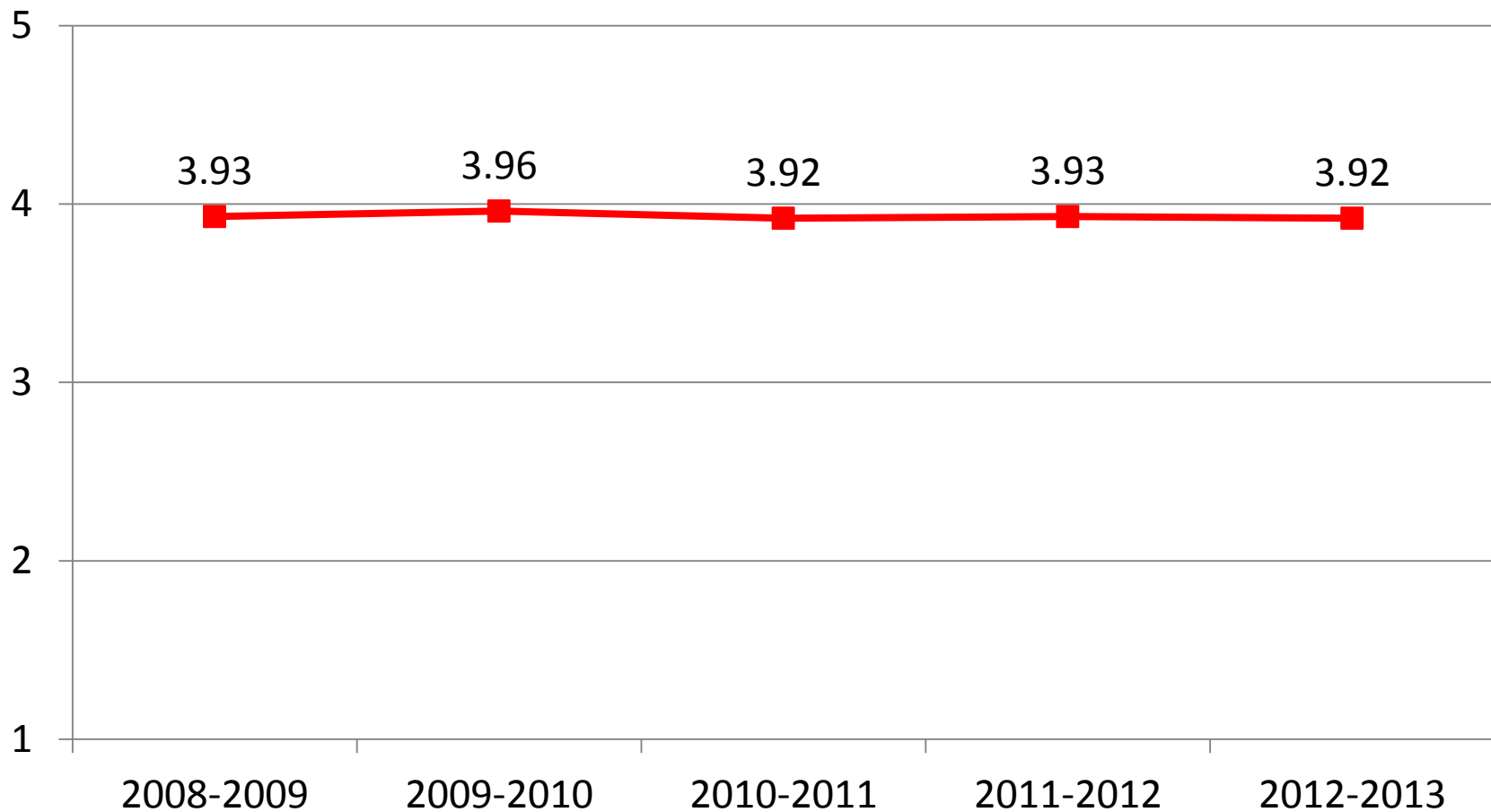
Q2a: During the past year, how satisfied were you with the capabilities of the researchers and quality of the research program?



Q2b: During the past year, how satisfied were you with the Center's breadth of research topics covered?



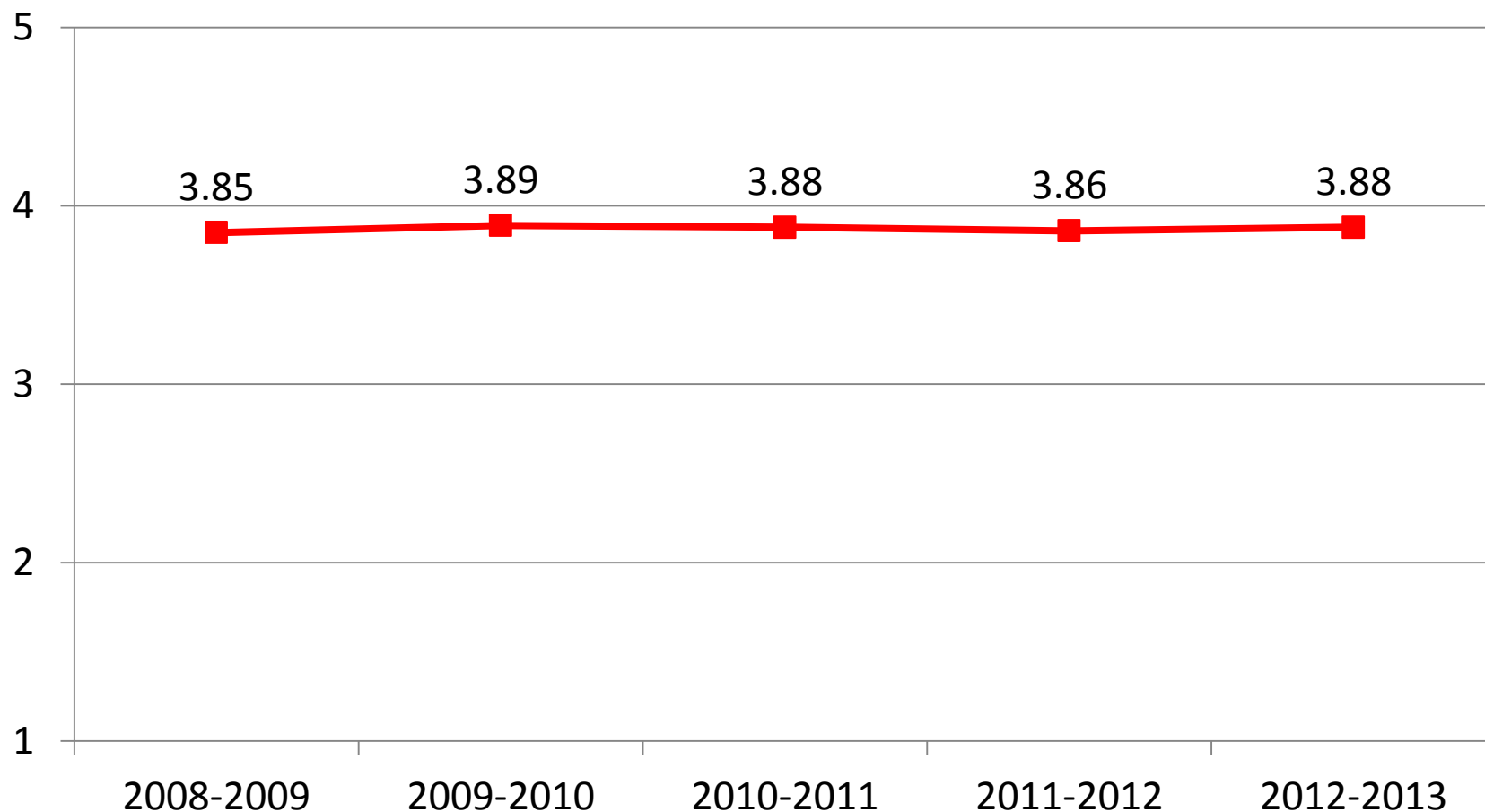
### Mean





# Q2c: During the past year, how satisfied were you with the Center's focus of the research?

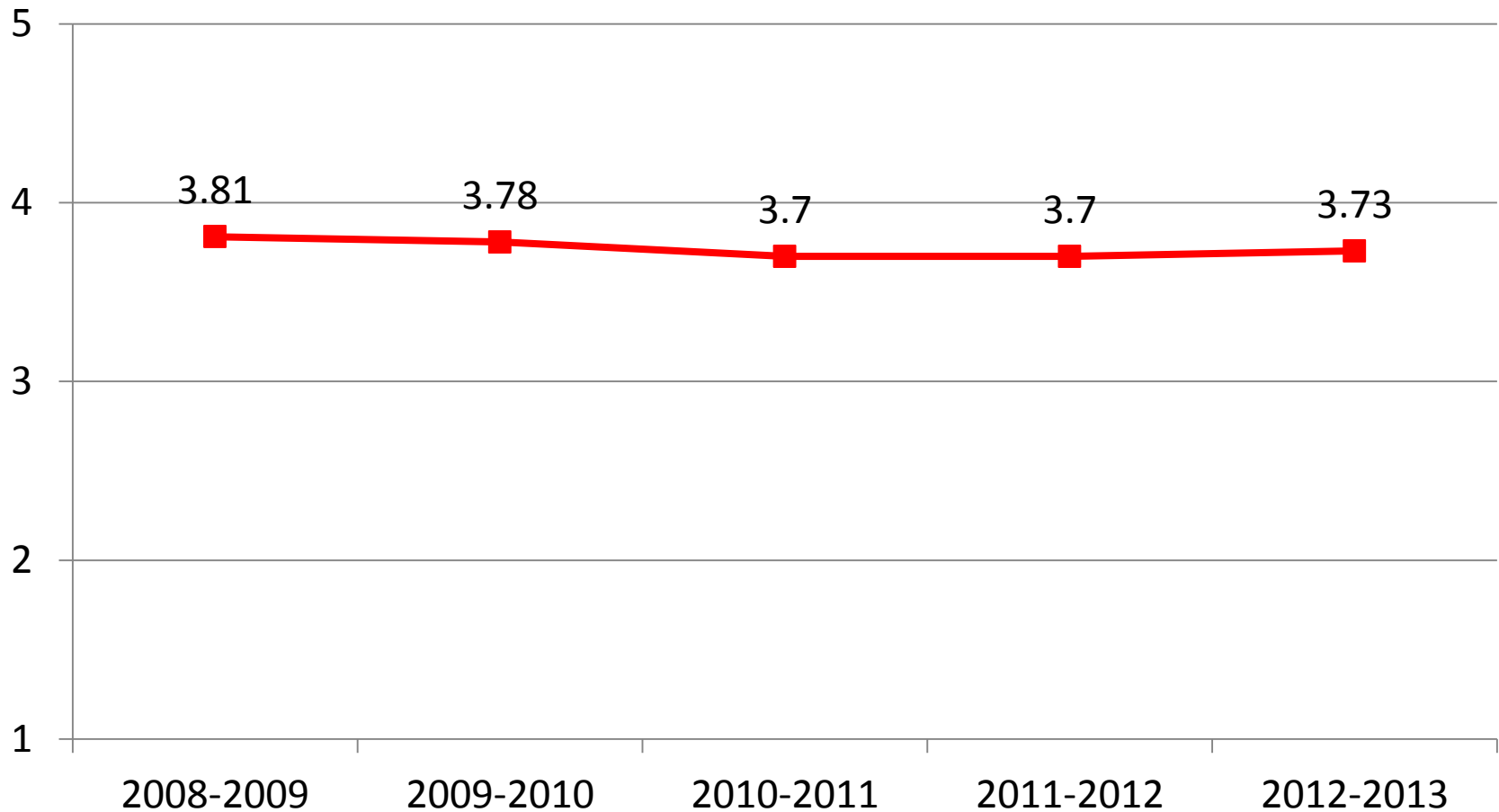
## Mean



# Q2d: During the past year, how satisfied were you with relevance of the research to my organizations needs?



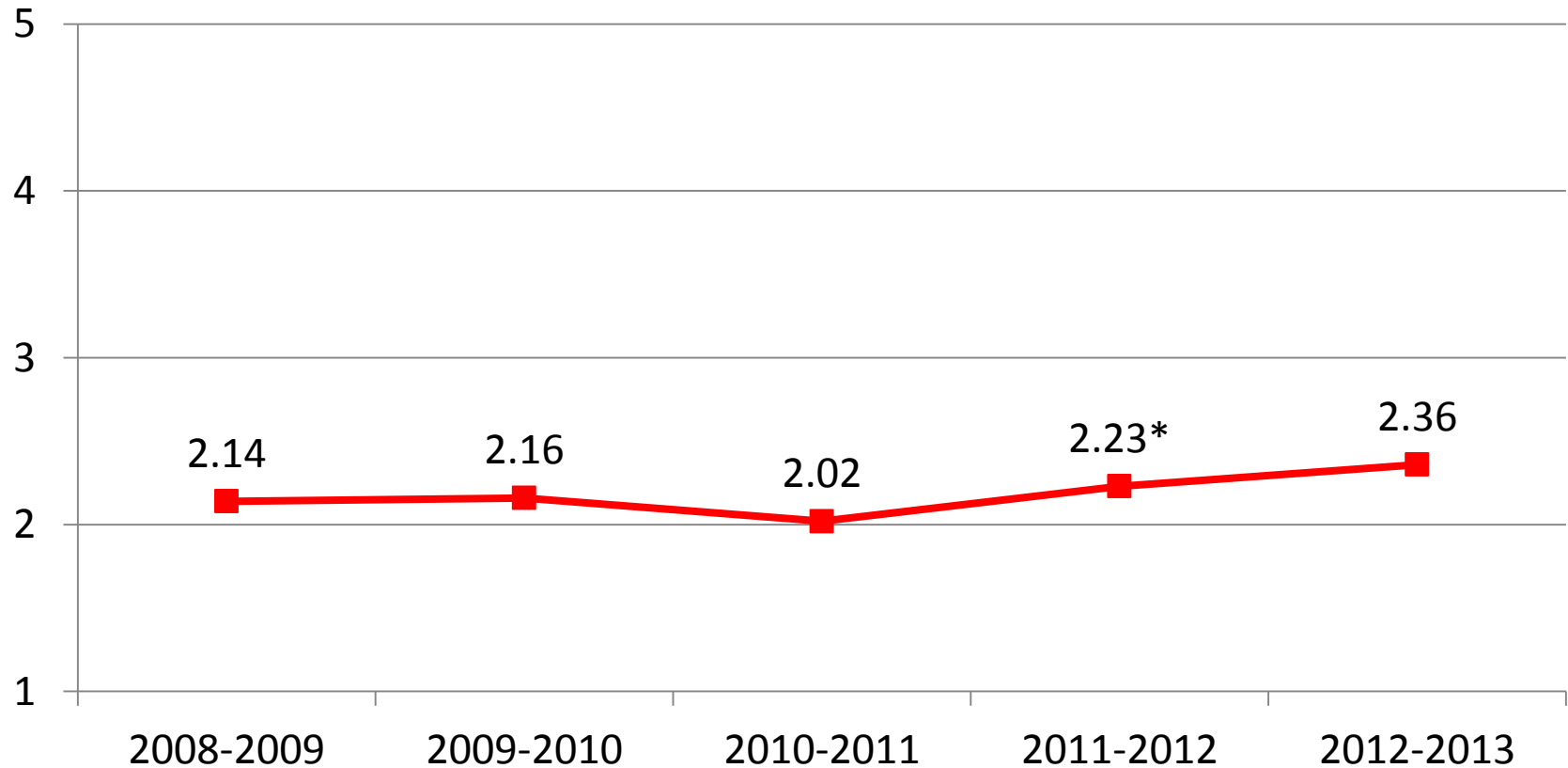
## Mean



Q6a: During the past year, to what extent has participation in the Center contributed to the following benefits for your organization?



### Commercialization

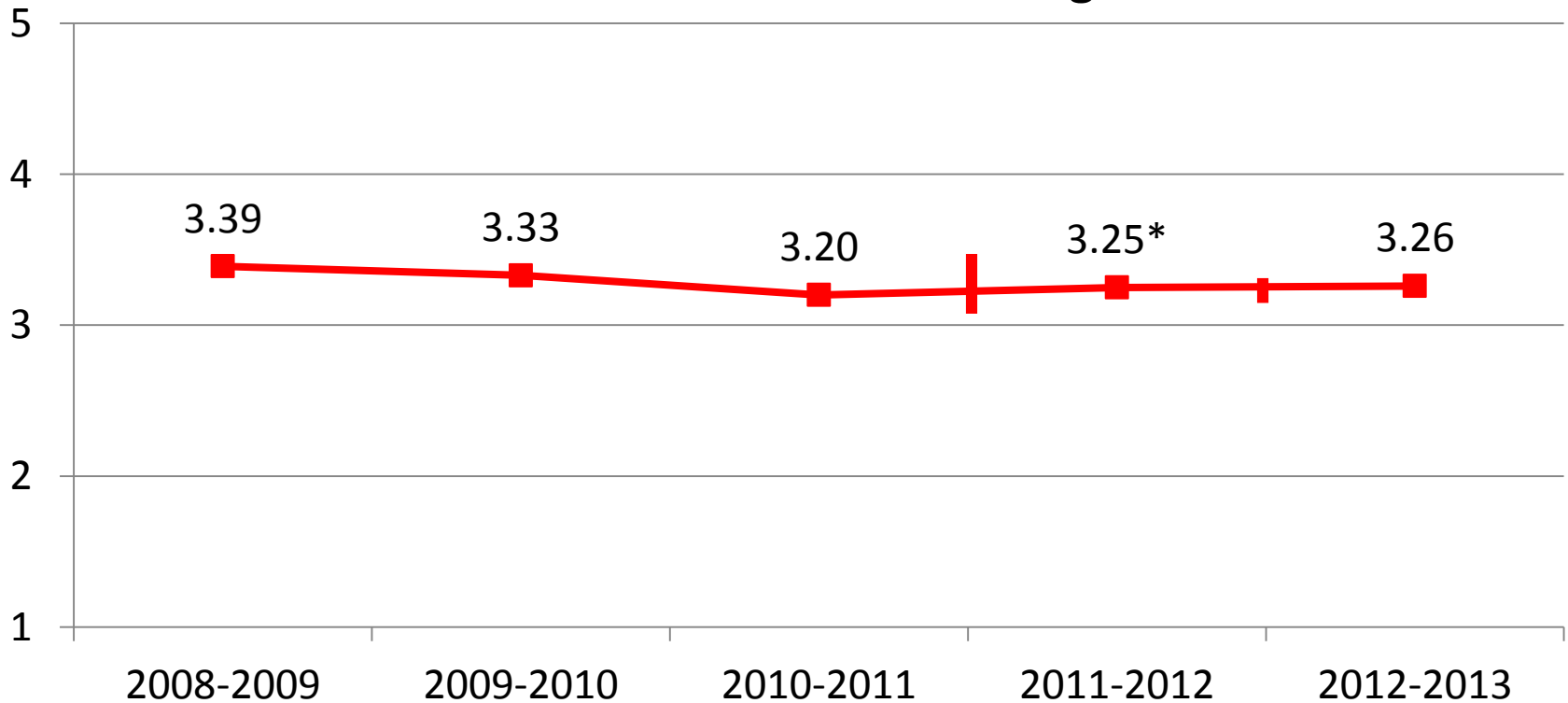


\*Question modified to include new technical knowledge and intellectual property resources

Q4a: During the past year, to what extent has participation in the Center contributed to the following benefits for your organization?



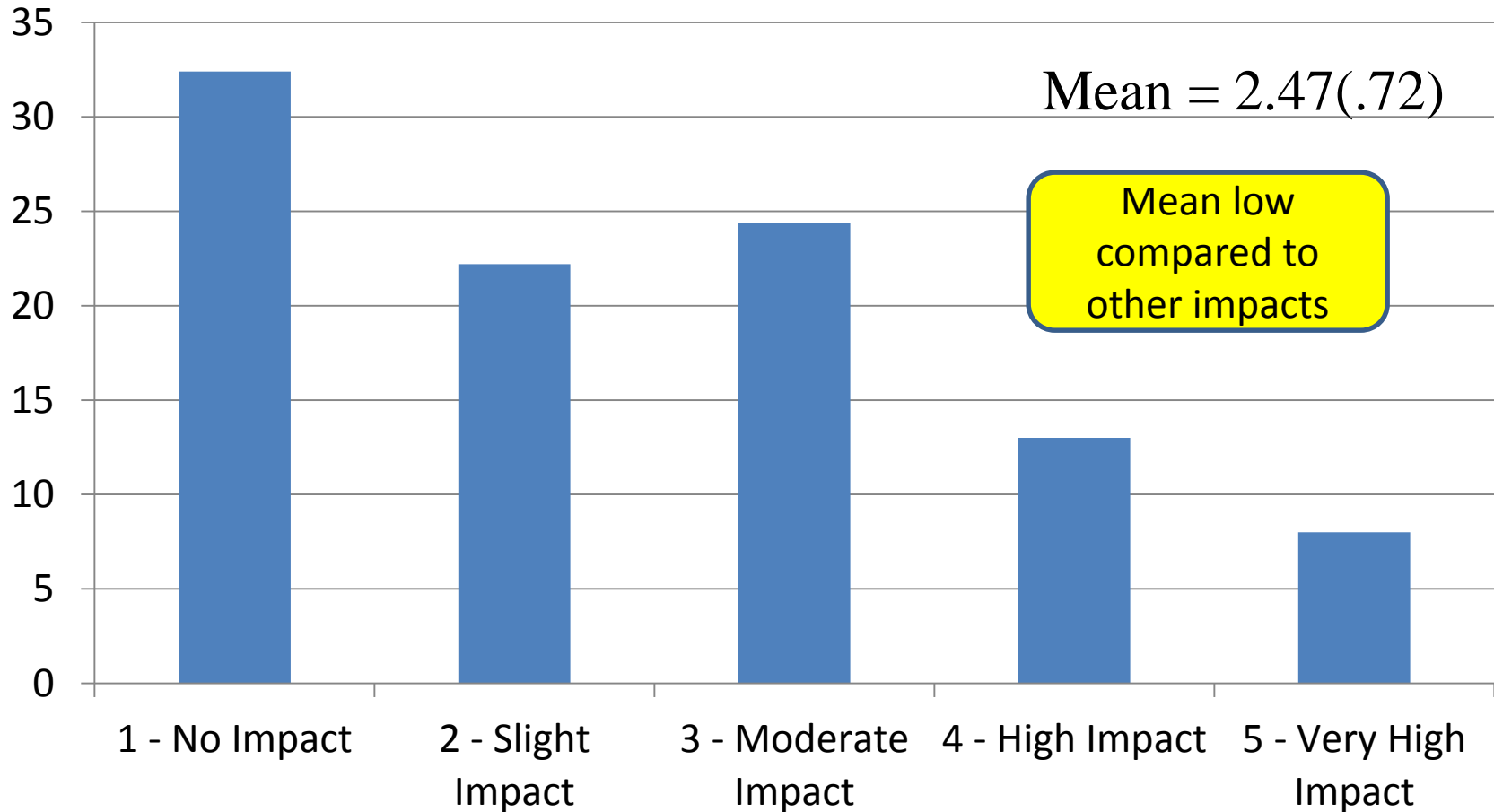
### Professional Networking



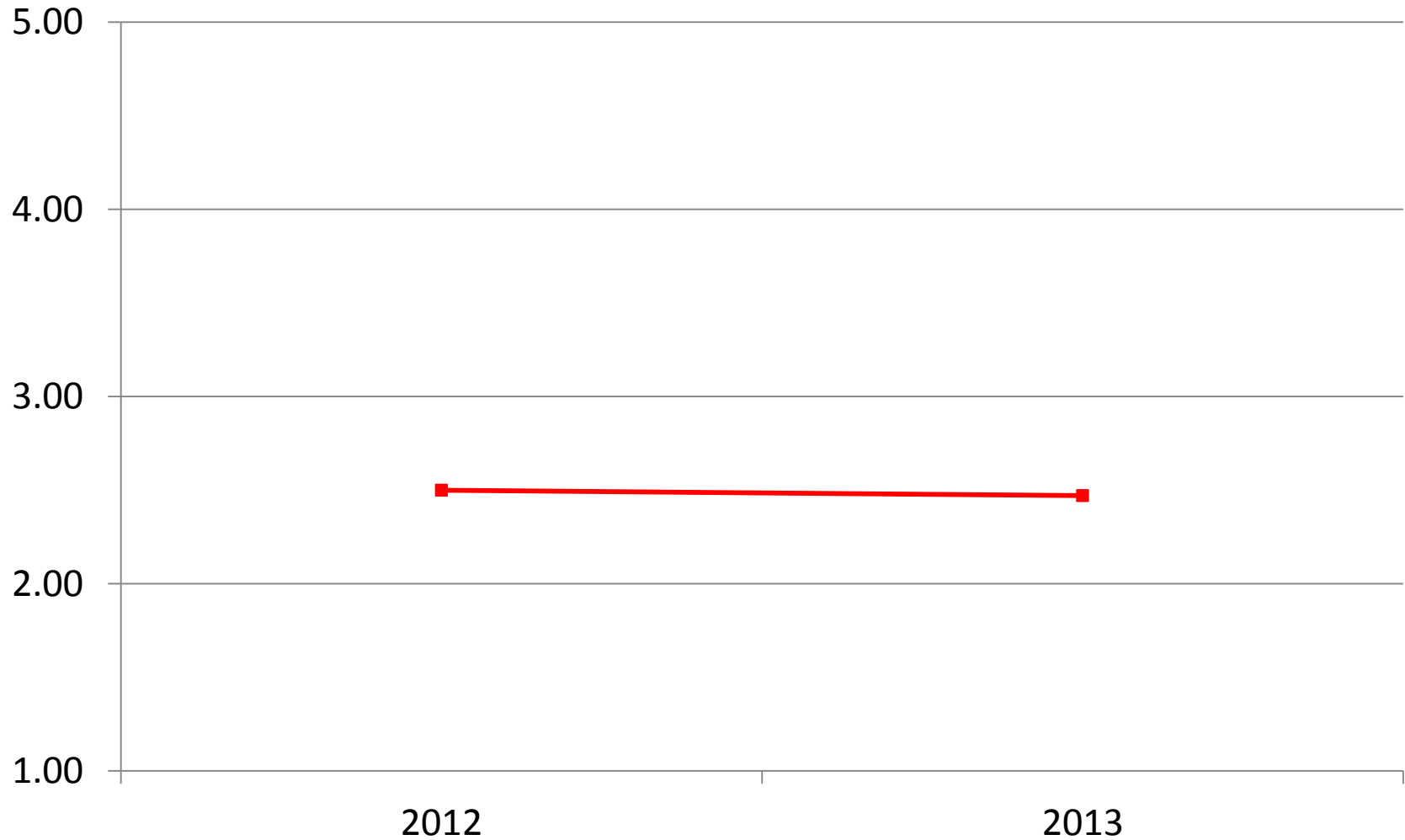
\*Question changed from “Enhanced via improved ability to recruit students, increased cooperation with other industrial members and scientists outside my organization” (2007-2011) to “Enhanced via ability to network and build scientific capacity via cooperation with industry and university scientists ...” (2012) to “Enhanced cooperation and networking with industry and university scientists ...” (2013).

# Q4b. Enhanced ability to identify and recruit well-qualified graduate students.

### Percentage Distribution



# Q4b. Enhanced ability to identify and recruit well-qualified graduate students.

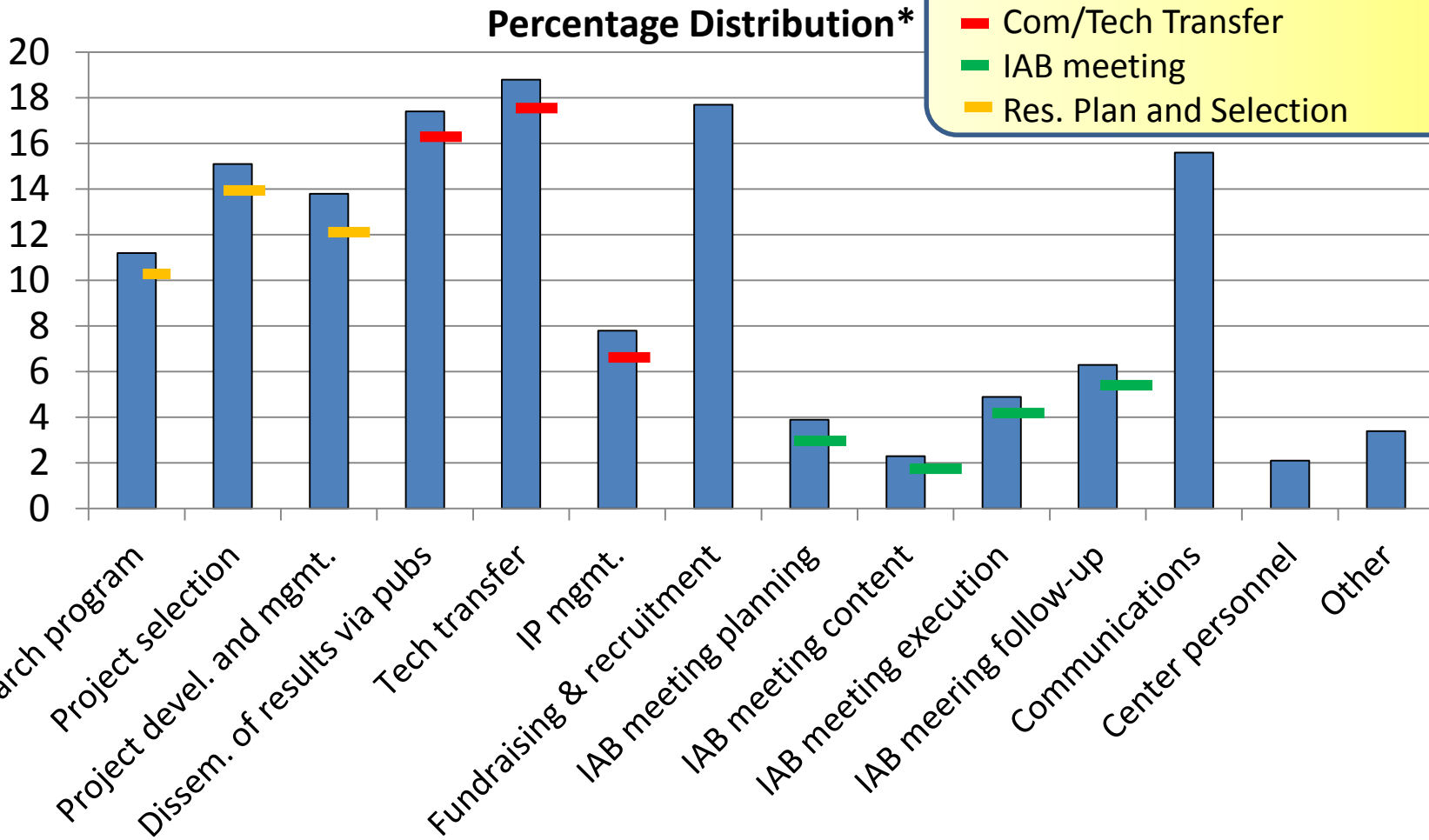


# Q8. How can the Center improve its administration and operations? Please mark areas that need improvement.



Themes:

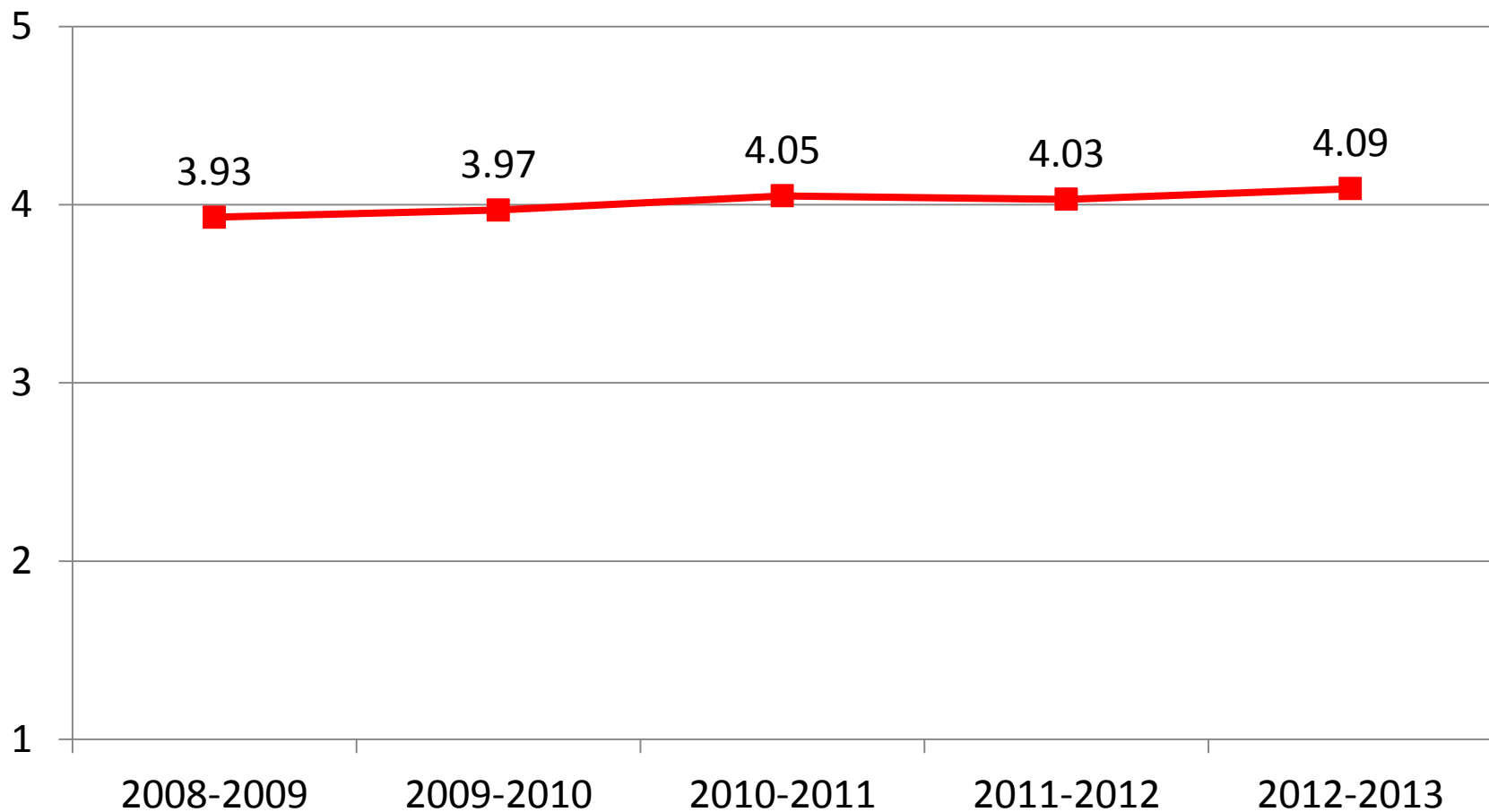
- Com/Tech Transfer
- IAB meeting
- Res. Plan and Selection



\*Respondents were encouraged to check as many boxes as applied. Therefore, the percentage across all items may total to greater than 100%.

# Q7: During the past year, how satisfied were you with center administrative operations?

## Mean

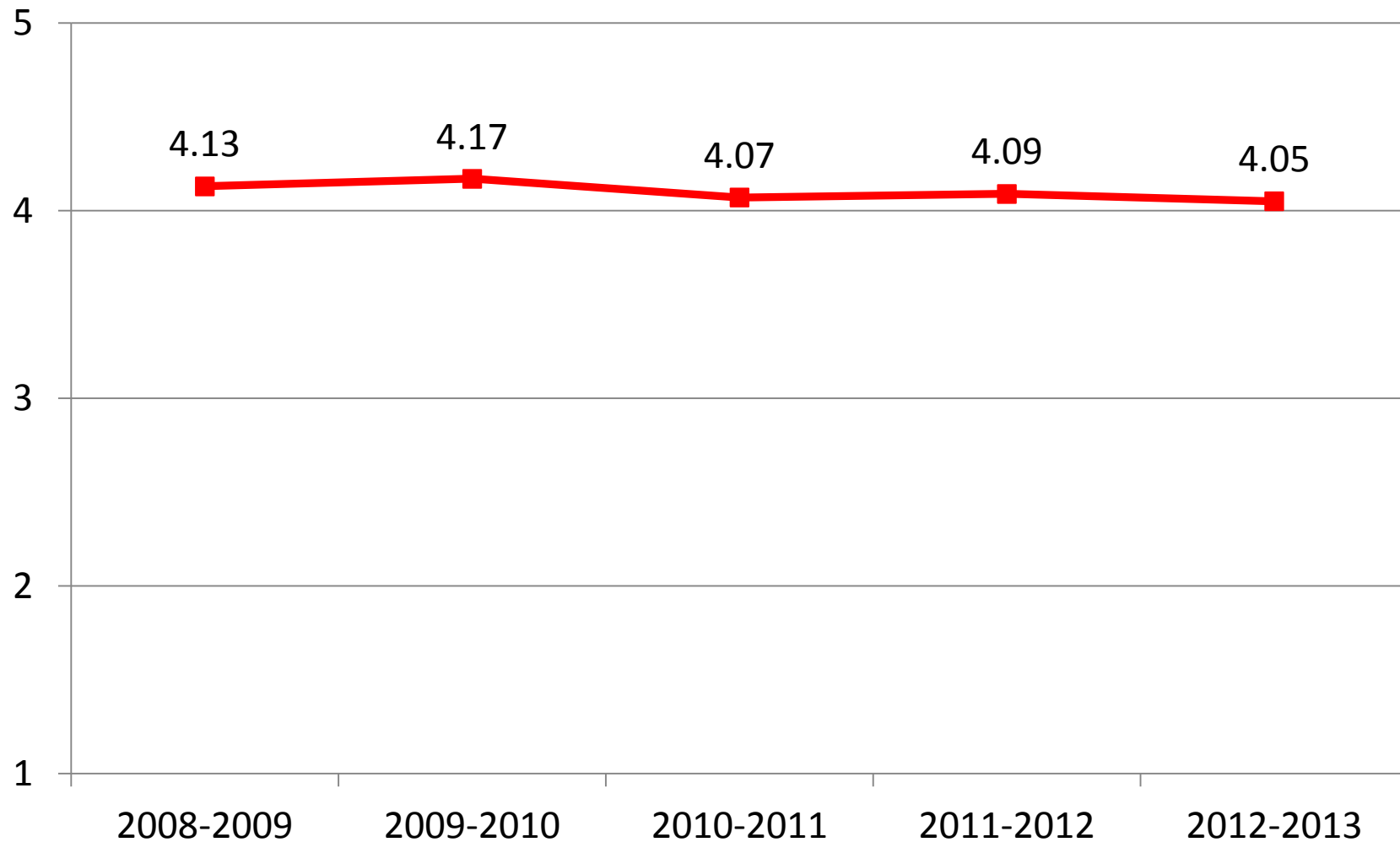






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# Q9: Will your organization renew its membership?





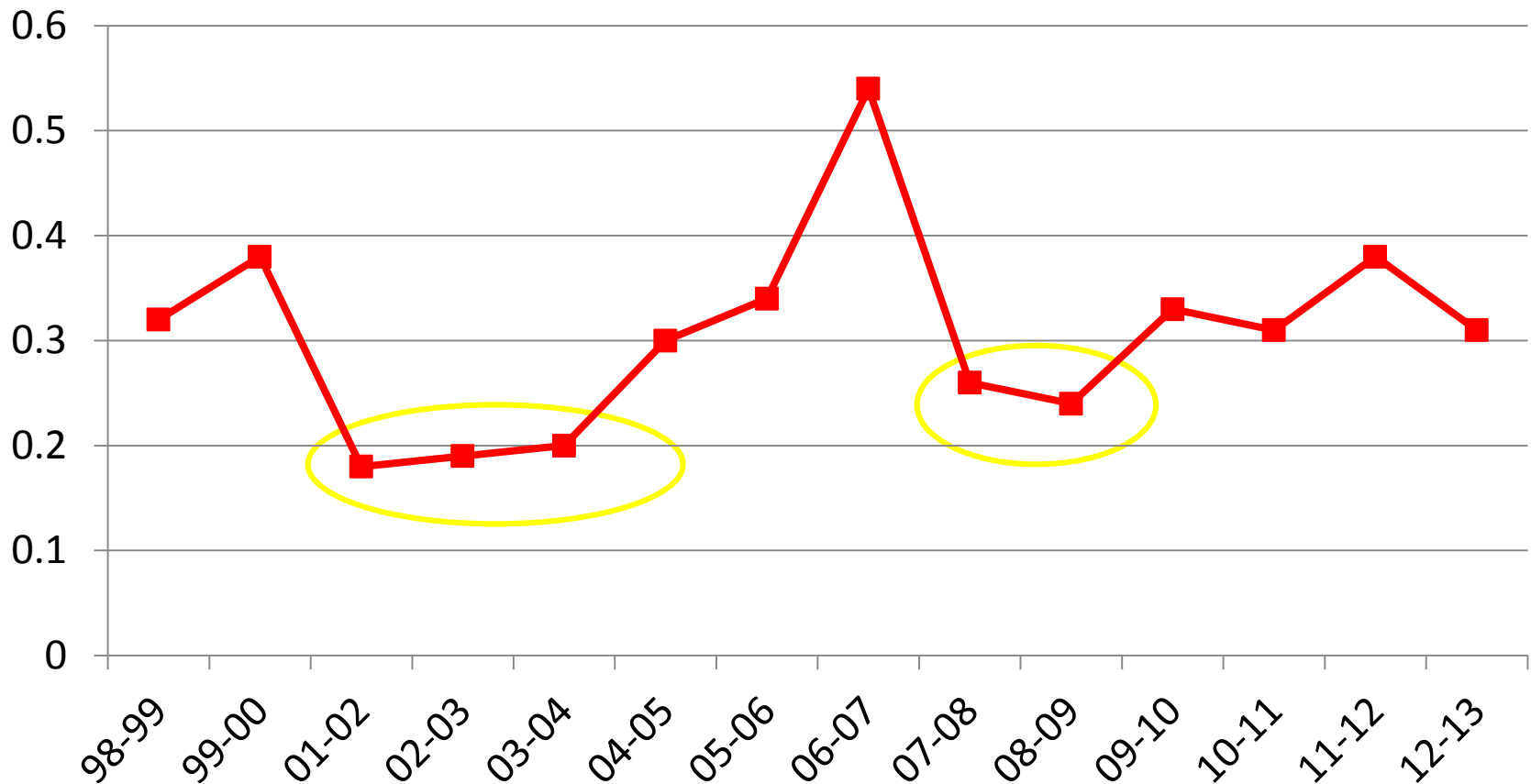
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# Students Hired

Q4c: During the past year, how many students trained in the Center projects were hired by respondent organization?



**Mean of Students hired**





# Industry Summary

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- As usual, stability across variables is the dominant pattern
- Ratings in most domains are relatively flat: research program, impacts, satisfaction, student hires
- Follow up Issues/Concerns
  - Student hires: maintain the rebound but impact on recruiting relatively low
  - Areas needing improvement
    - Communication/technology transfer
    - Recruiting/fund raising
    - IAB meetings' organization
    - Research planning and selection
- Despite some issues and concerns, members' satisfaction remains consistently high.



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# Faculty Questionnaire

Select Results

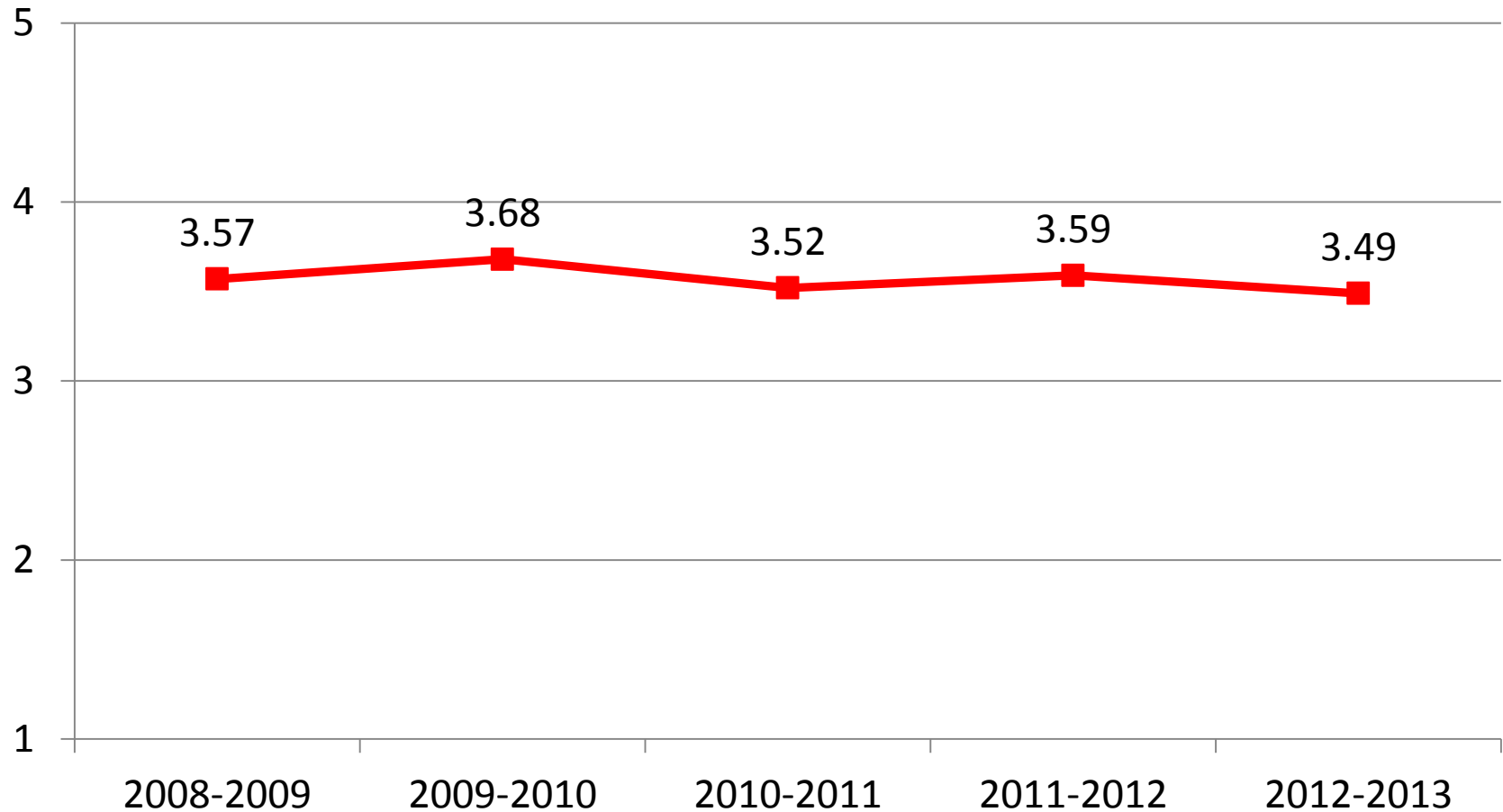
# Faculty Long and Short Forms

	Long Form	Short Form
# of items	13	6
# of questions in common	6	6
# of unique questions	7	0
# of centers using form	26	14
Sample size	161	136

Q1: Compared to the research projects you typically conduct, would you describe your Center-funded research as more basic or applied?



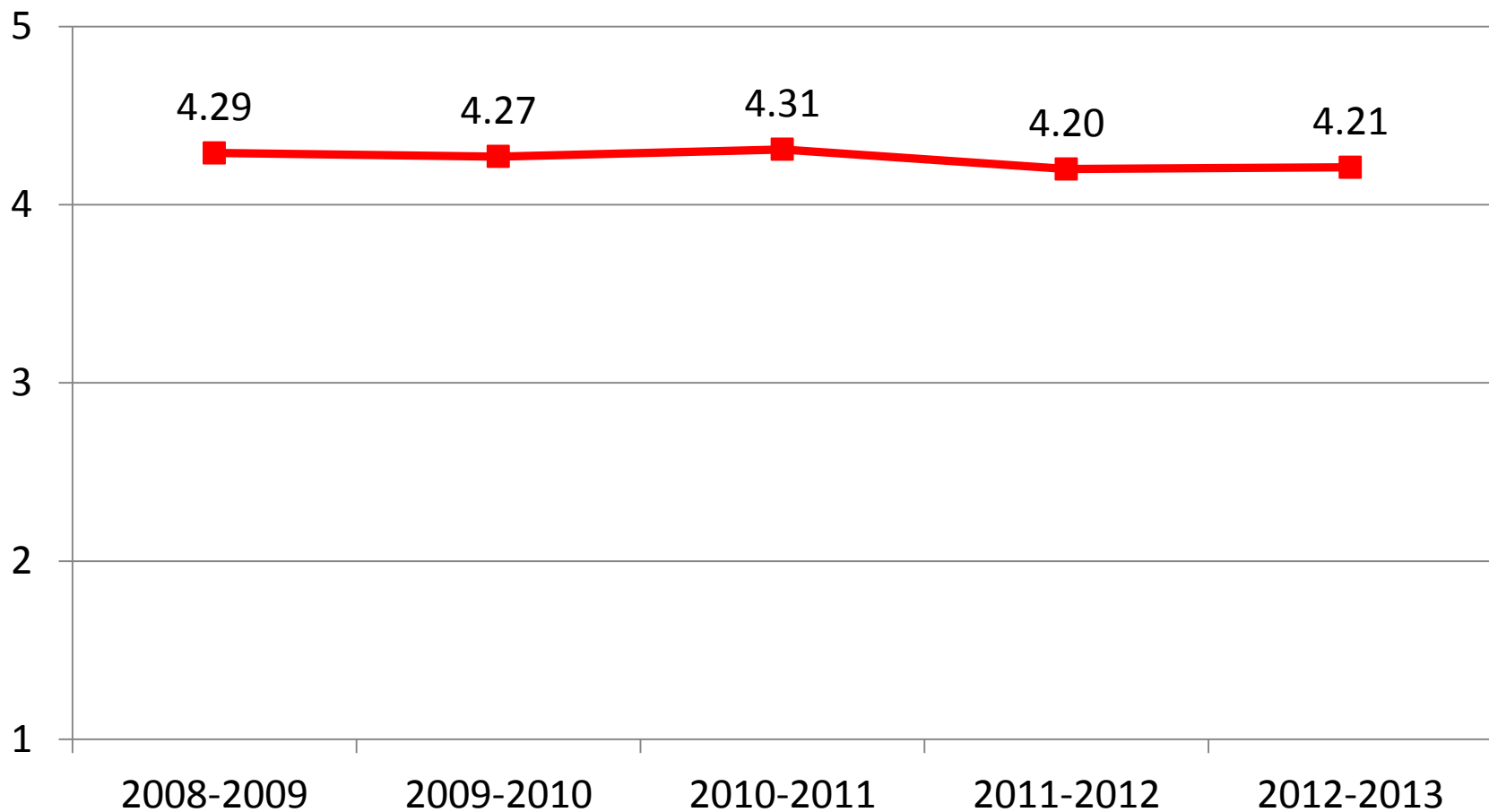
### Mean



# Q2a: During the past year, how satisfied were you with the quality of center-supported research program?



## Mean

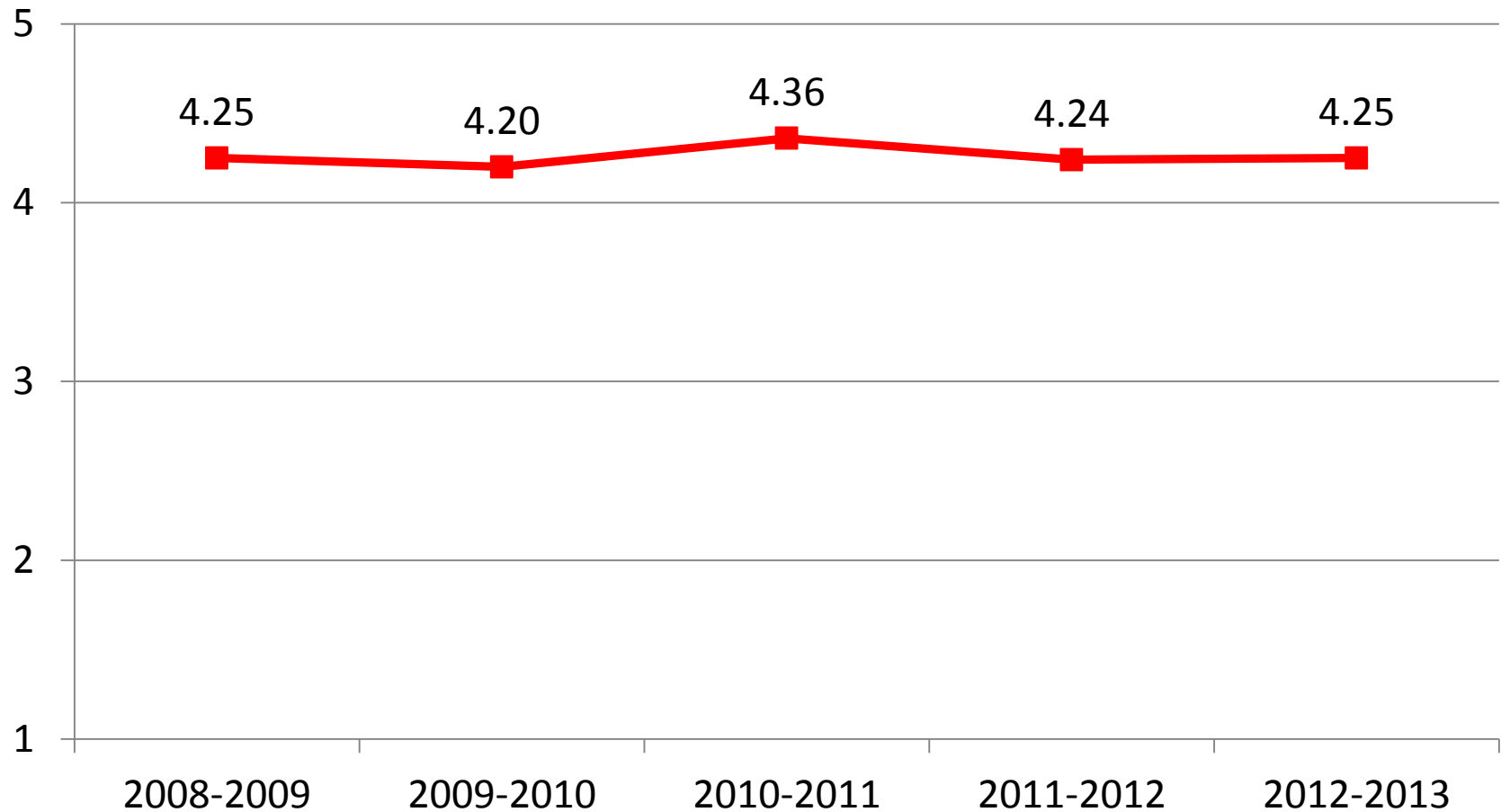




Q2b: During the past year, how satisfied were you with the relevance of the Center's research program to my professional goals?



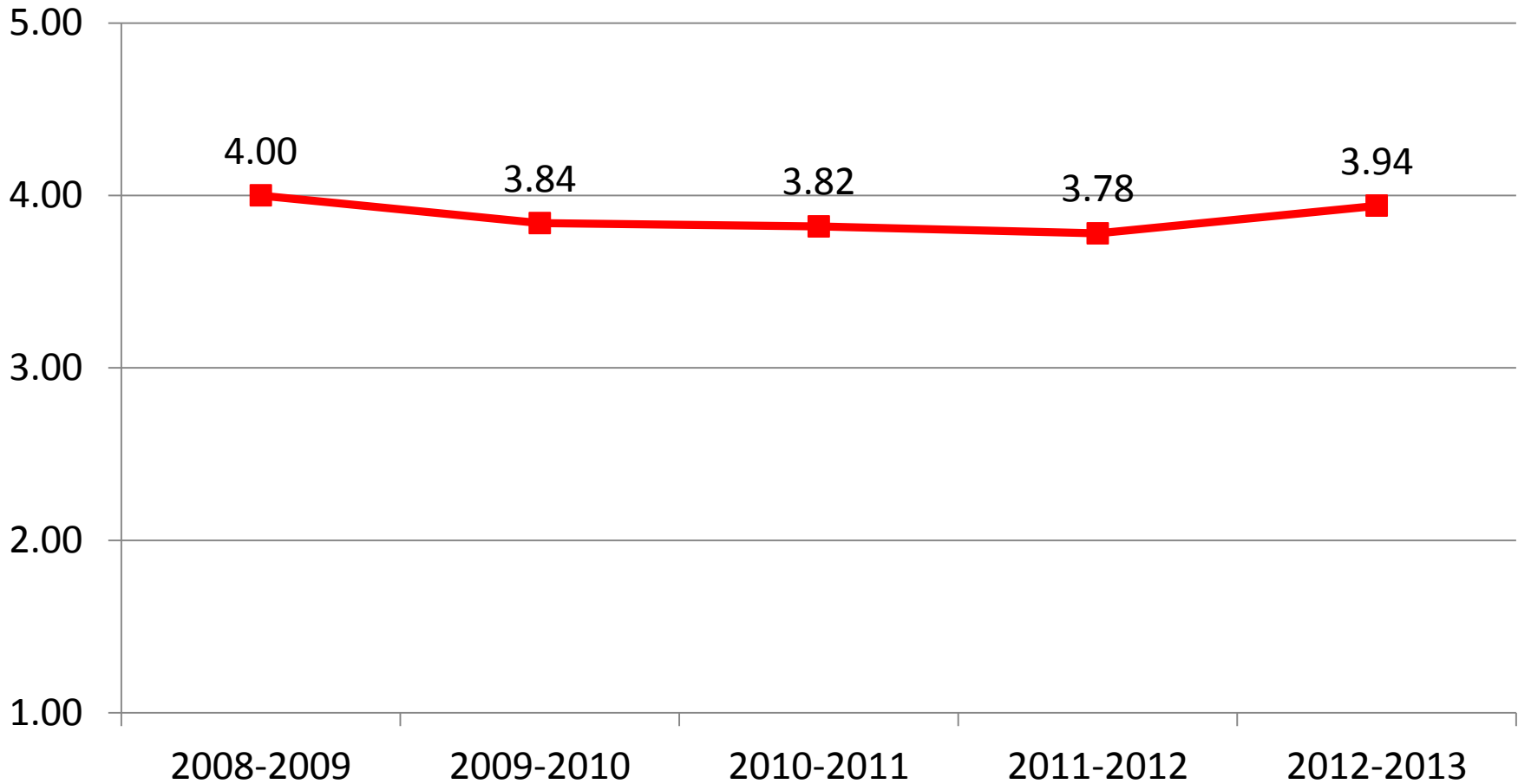
### Mean



Q4a: During the past year, what impact has participation in the Center had for YOU in the following areas?



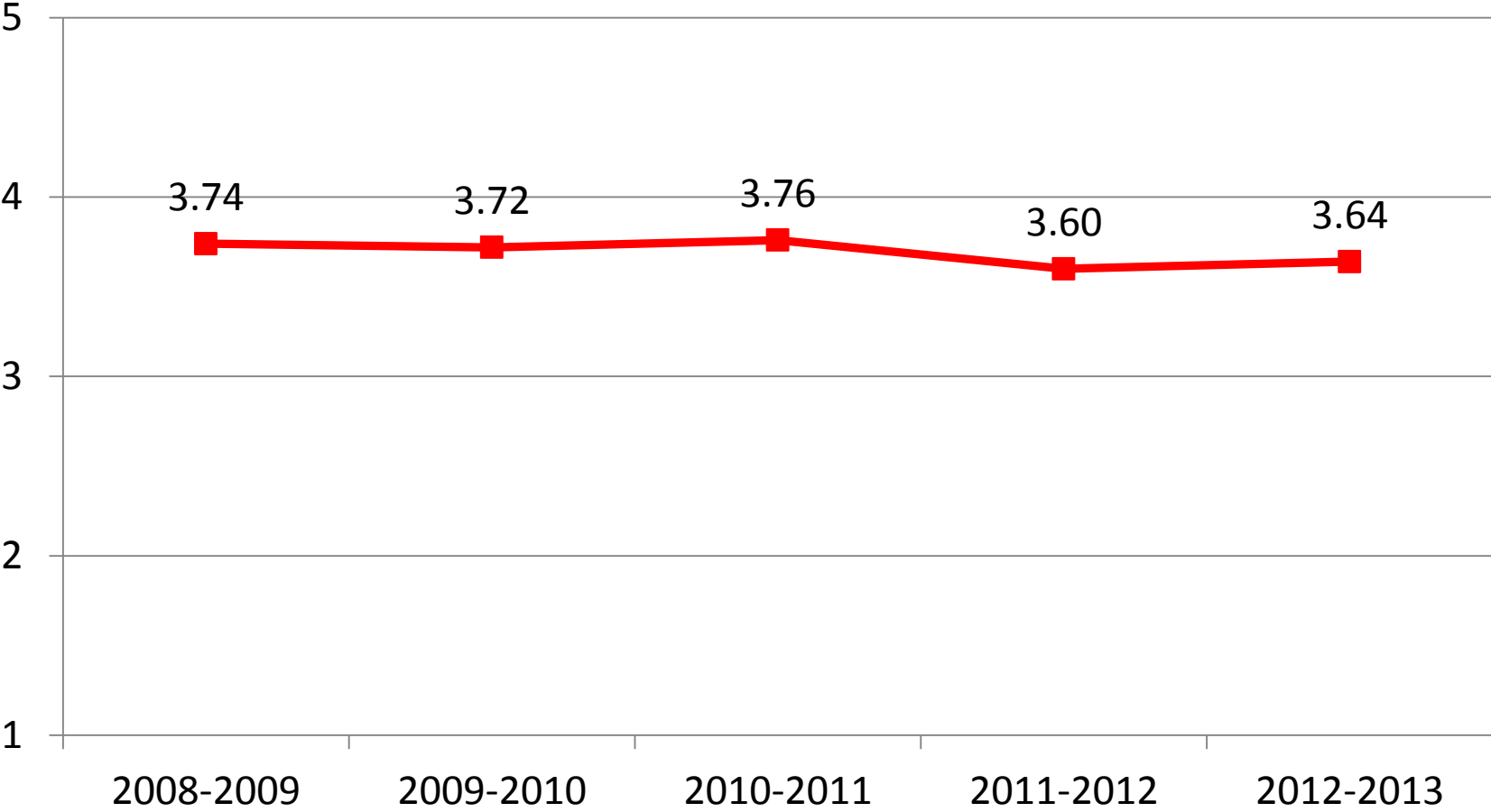
### The feeling of accomplishment I get from the research I do



Q4b: During the past year, what impact has participation in the Center had for YOU in the following areas?



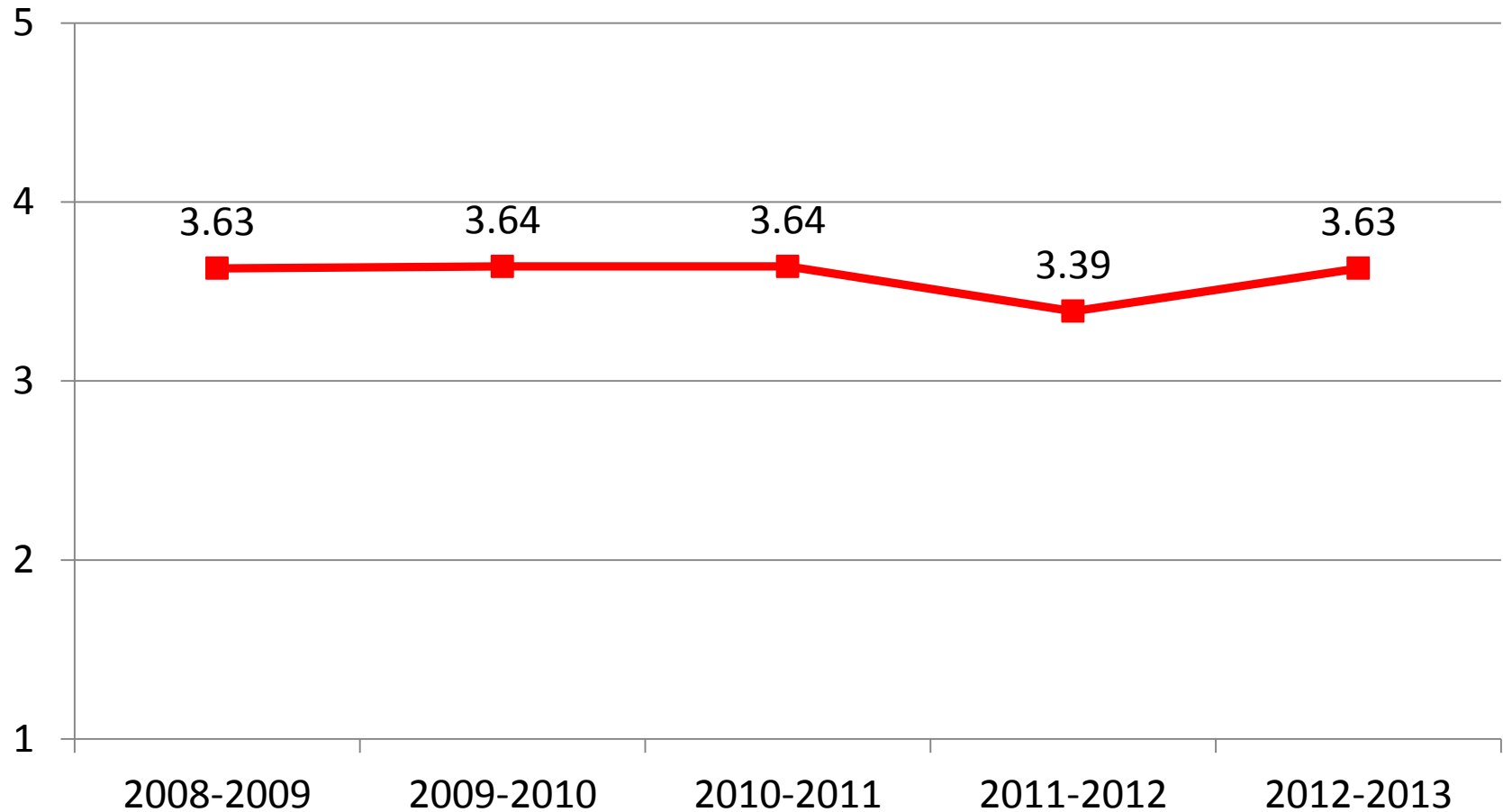
**Opportunities for research contracts/grants**



Q4c: During the past year, what impact has participation in the Center had for YOU in the following areas?



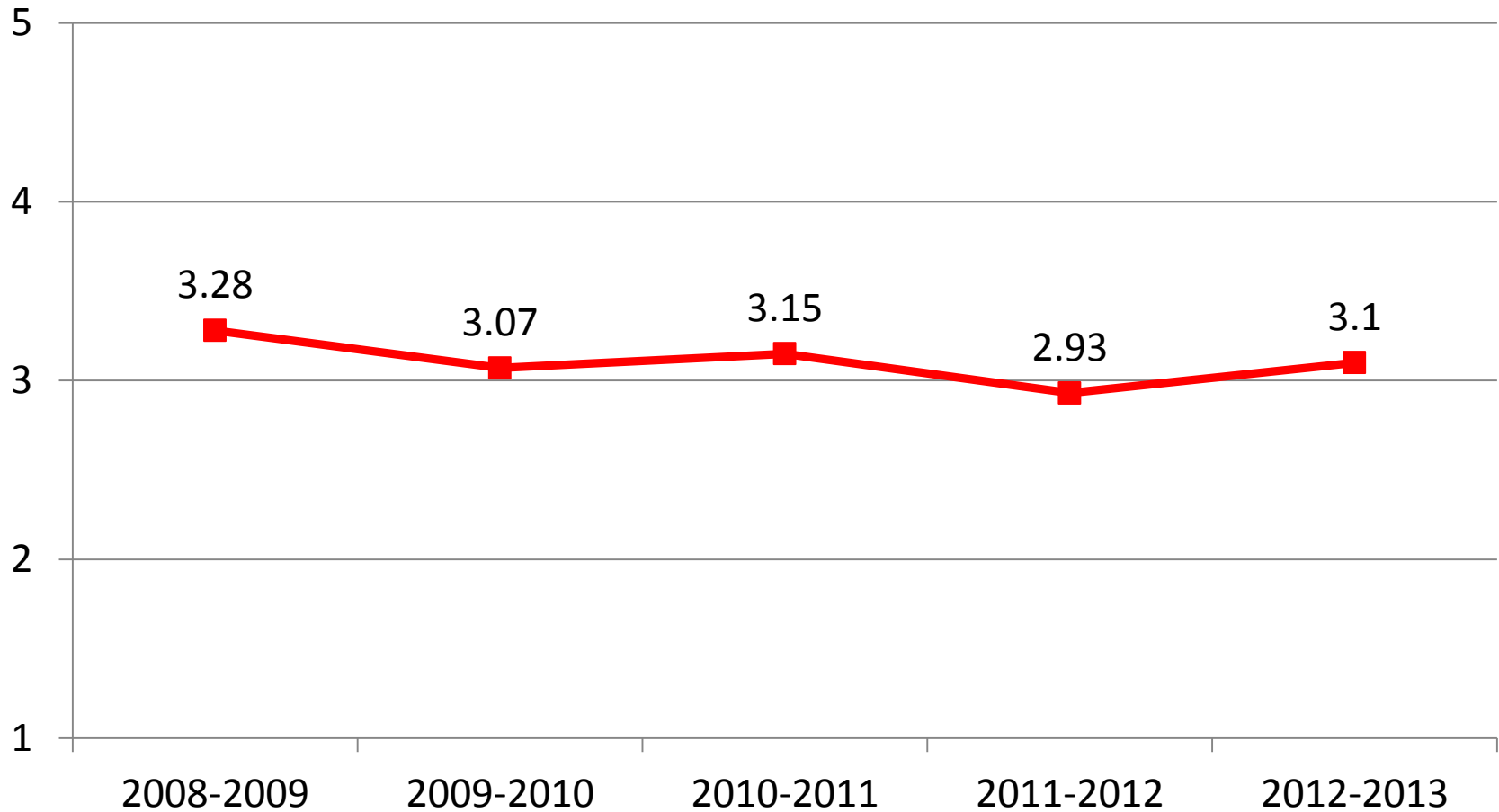
### Recognition I receive for the work I do



Q4d: During the past year, what impact has participation in the Center had for YOU in the following areas?



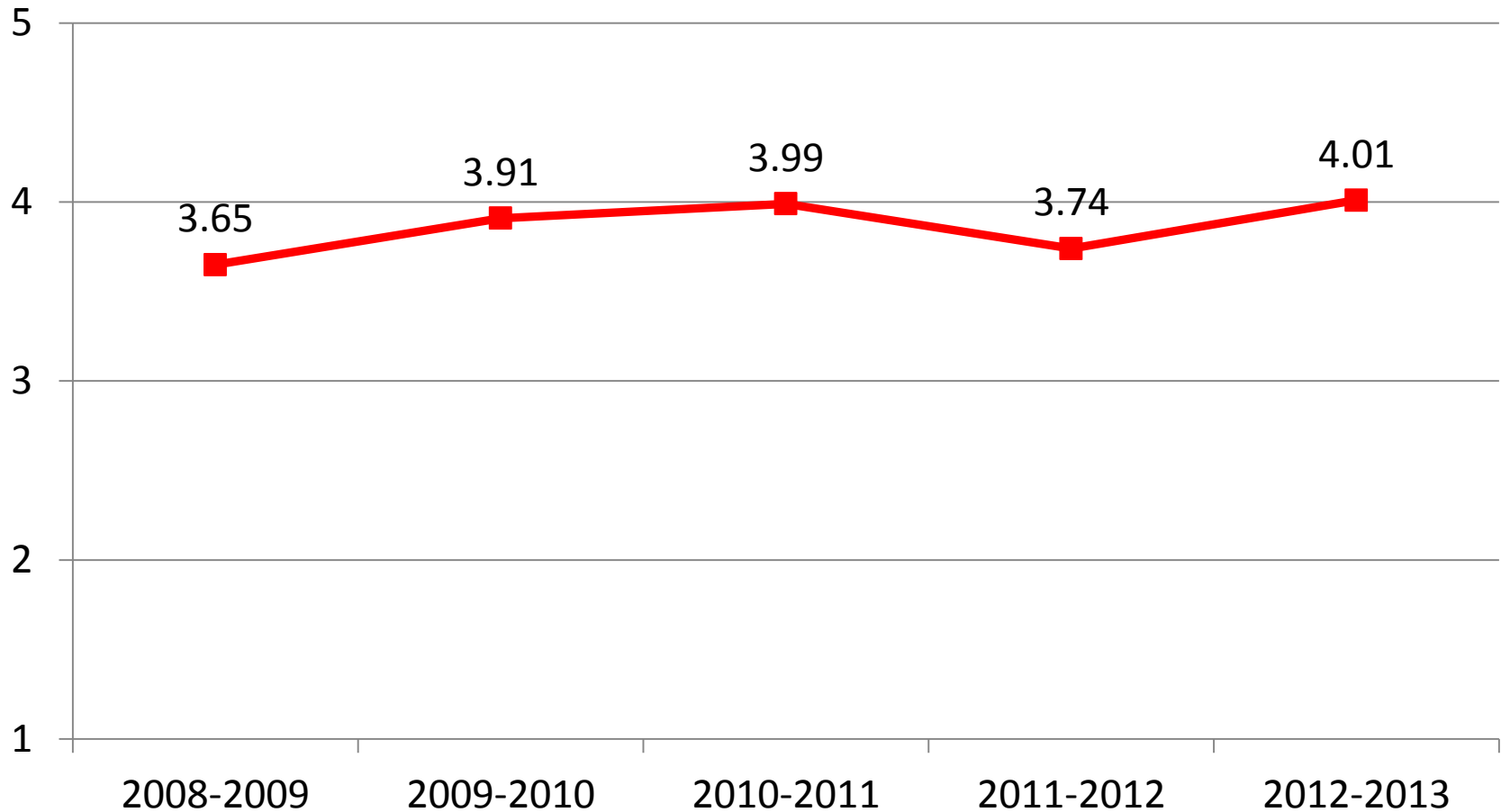
### Access to useful equipment



Q4e: During the past year, what impact has participation in the Center had for YOU in the following areas?



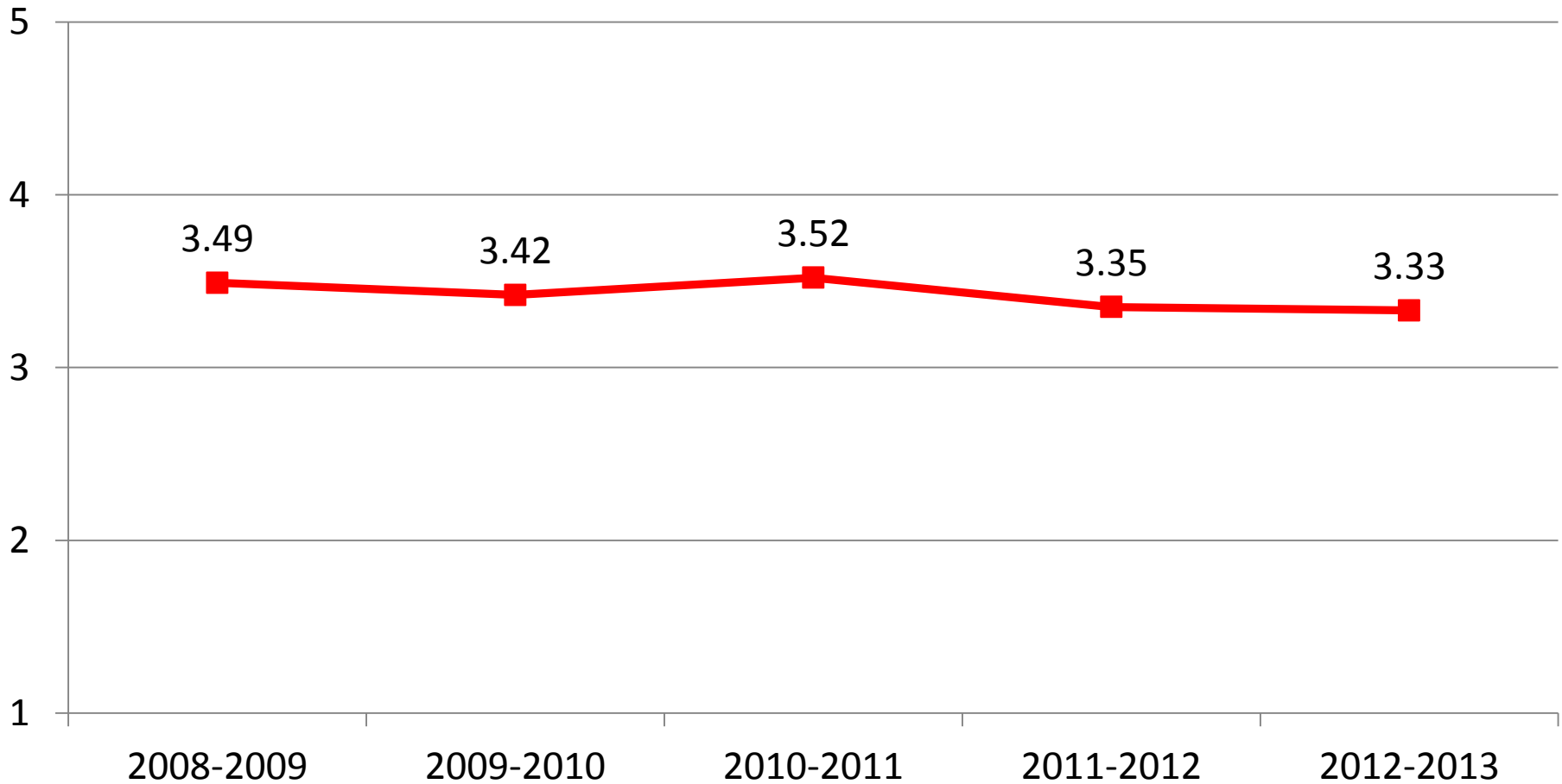
### Ability to support graduate students



Q4f: During the past year, what impact has participation in the Center had for YOU in the following areas?



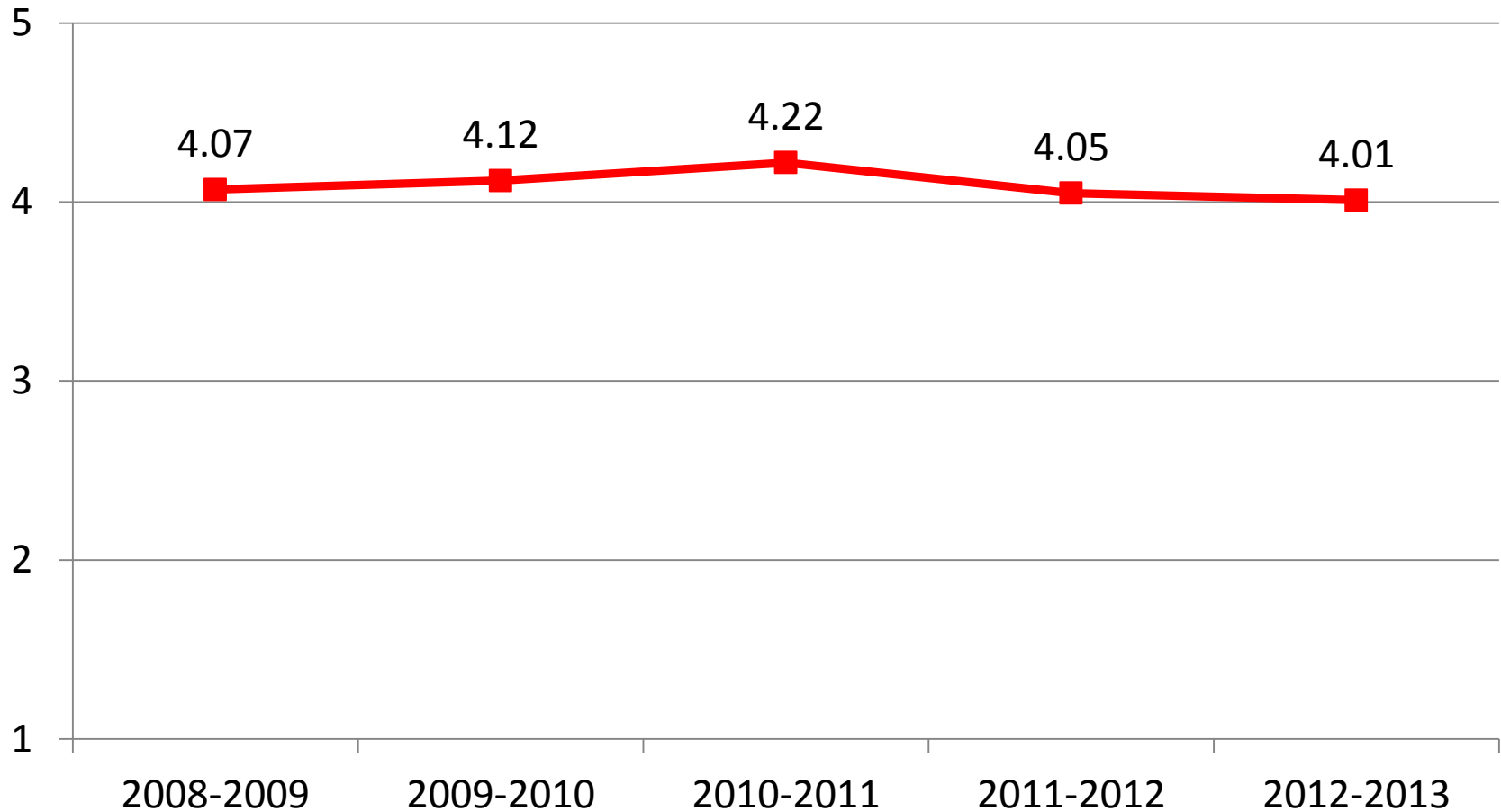
### Ability to publish my work in quality proceedings and journals



Q5: Which option best expresses your current intentions? Next year I will submit my best research ideas in a center funded proposal.



### Mean

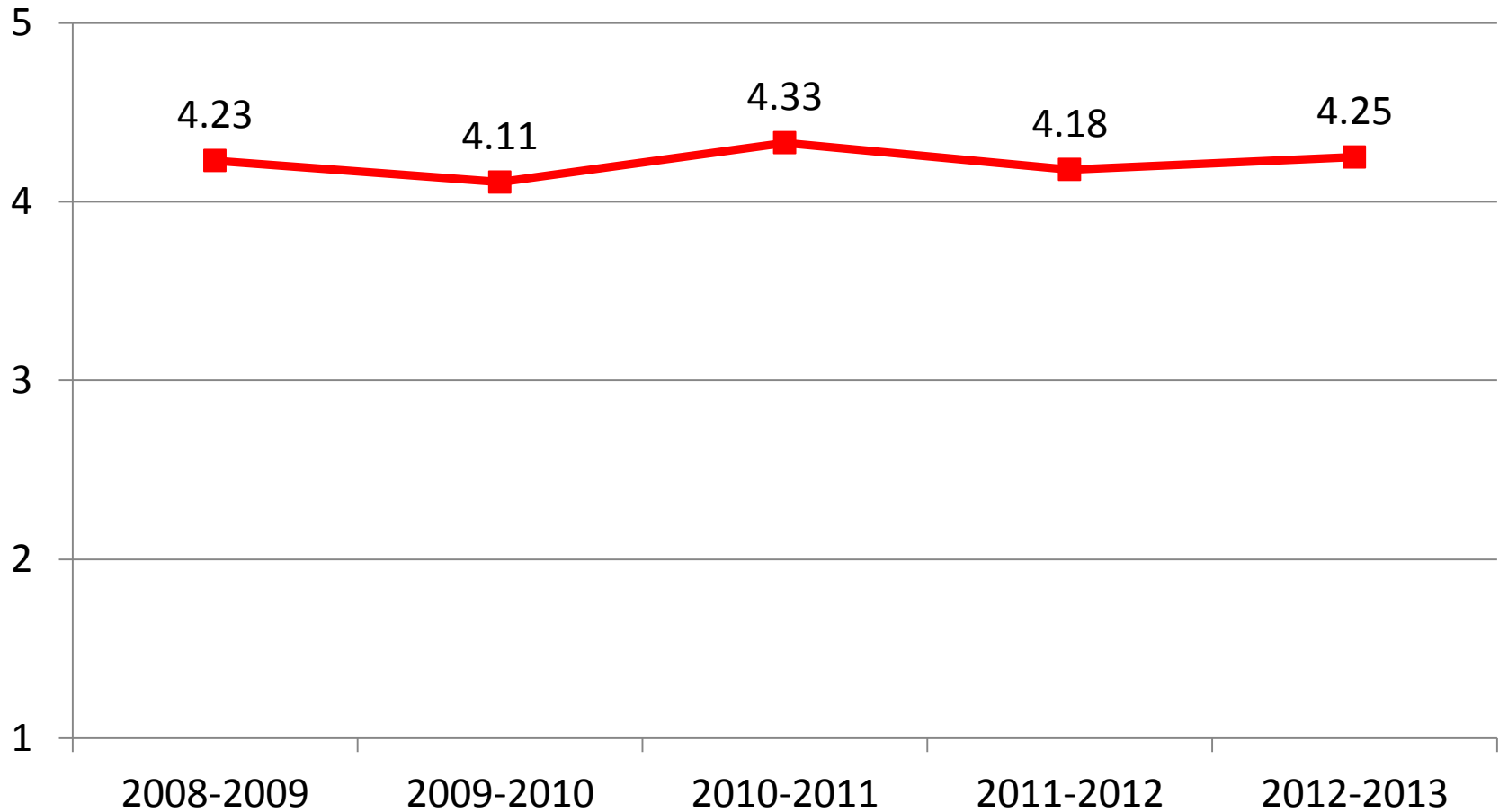




# Q6: During the past year, how satisfied were you with center administrative operations?



**Mean**





# Faculty Summary

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- Most indicators are relatively stable
  - Keep using benchmarks: variability between centers is key issue.

# How Should These Process/Outcome Results be Used?

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- Trends are probably much more interpretable at local center level
  - Director leaves; research direction changes; move from one-on-one to consortial center
- Benchmark center against previous year and national norms
  - By comparing means, medians, and standard deviations, evaluators can see how their centers compare to national “norms”
  - Insert national data into industry software tools for this year/last year comparisons with your center
  - Move current center means to previous year in e-mail software package
- Caution:
  - Deteriorating response rate undermines the validity and usefulness of feedback
    - Need to reinvent our methods
    - Cautiously considered interpretation



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# Incorporating Economic Impact Assessment into Industry Questionnaire



# Purpose and Overview

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- Revisit the findings on the economic impact questions added to the questionnaire 2011-12



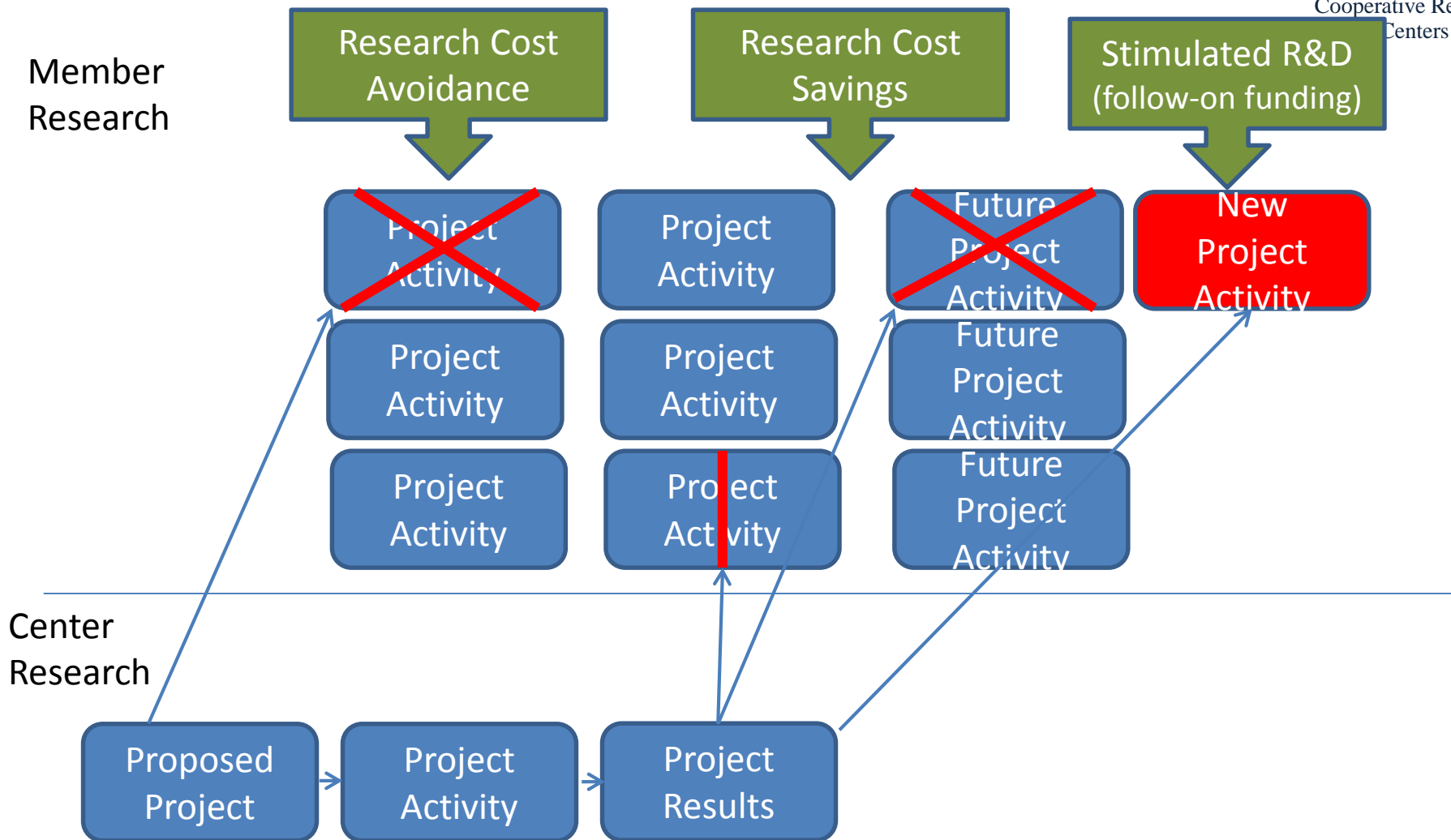
# Calculation of Economic Impacts (\$)

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- Research amplification (Q1a & Q1b)
  - *Percent Rel. x N of Center Proj. x Scien. Months x \$/Scien. Month (Gray & Steenhuis, 2003)*
- Cost Avoidance (Q1a & 1b)
  - *N of Proj. Avoid x Scien. Months x \$/Scien. Months (Gray & Steenhuis, 2003)*
- R&D Cost Savings
- Accelerated R&D savings or Avoided R&D (5c):
  - *\$ saved by accelerated projects or \$ avoided by not starting projects*
- Stimulated R&D (5f):
  - *\$ invested in new or re-directed internal R&D*



# Defining Research Efficiency Measures





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# Findings



# Stimulated R&D (follow-on funding)

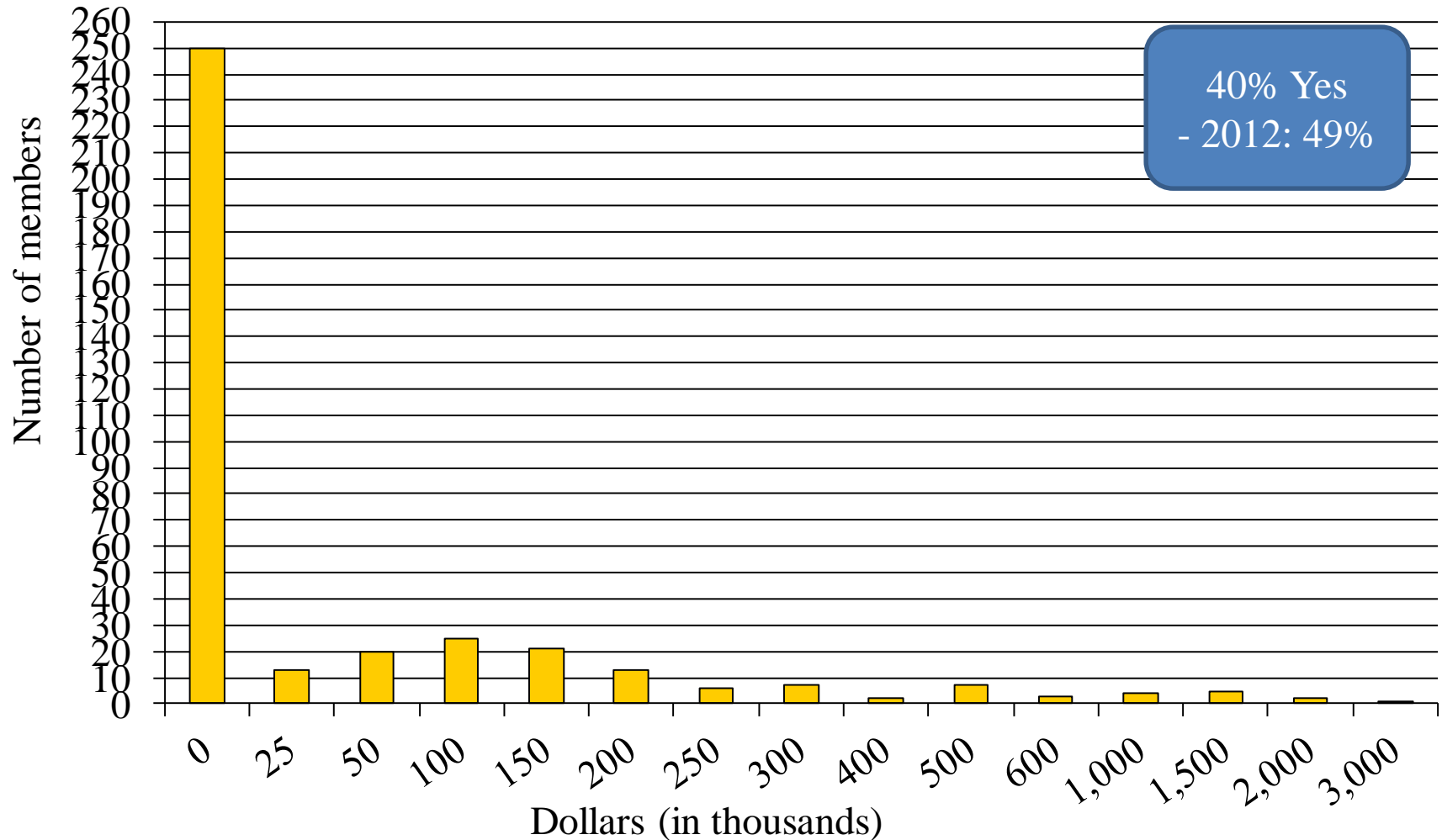
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- What changed?
  - **Old:** Approximately how many **center-stimulated** research projects were supported by your organization (include internal projects and projects contracted to outside performers).
  - **New (2012):** Access to Center research findings and outputs has **triggered the development** of new R&D projects at my organization, or significantly redirected current R&D. (Y/N) (5c)
  - **Edited New (2013):** During the last year, has access to Center research findings and outputs triggered development of new R&D projects, or significantly redirected **pending projects within your organization?** (Y/N) (5d)

# Value of Center-Stimulated Projects: FY 2012-2013



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# Estimating IUCRC-Wide Center-Stimulated Funding

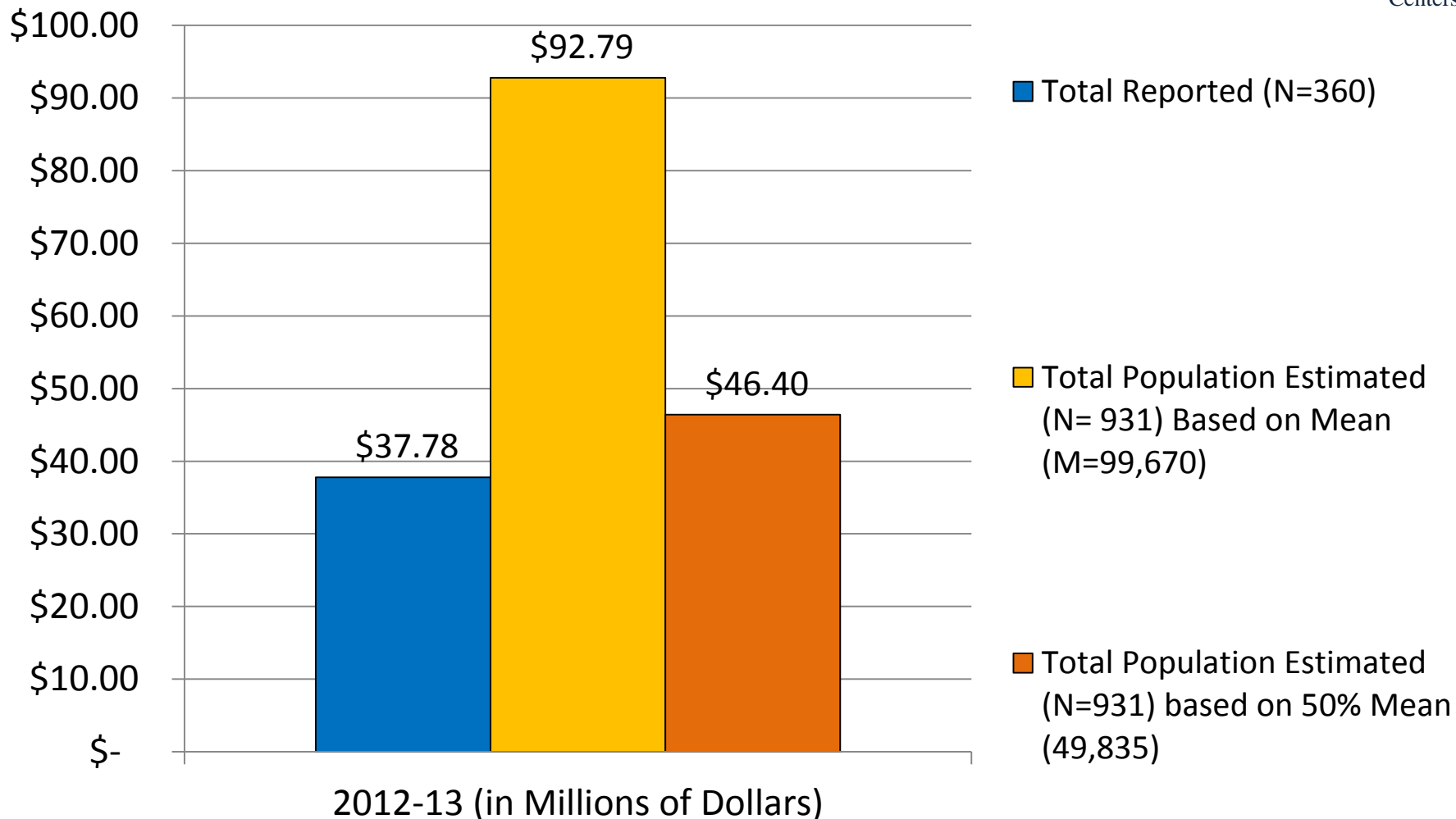
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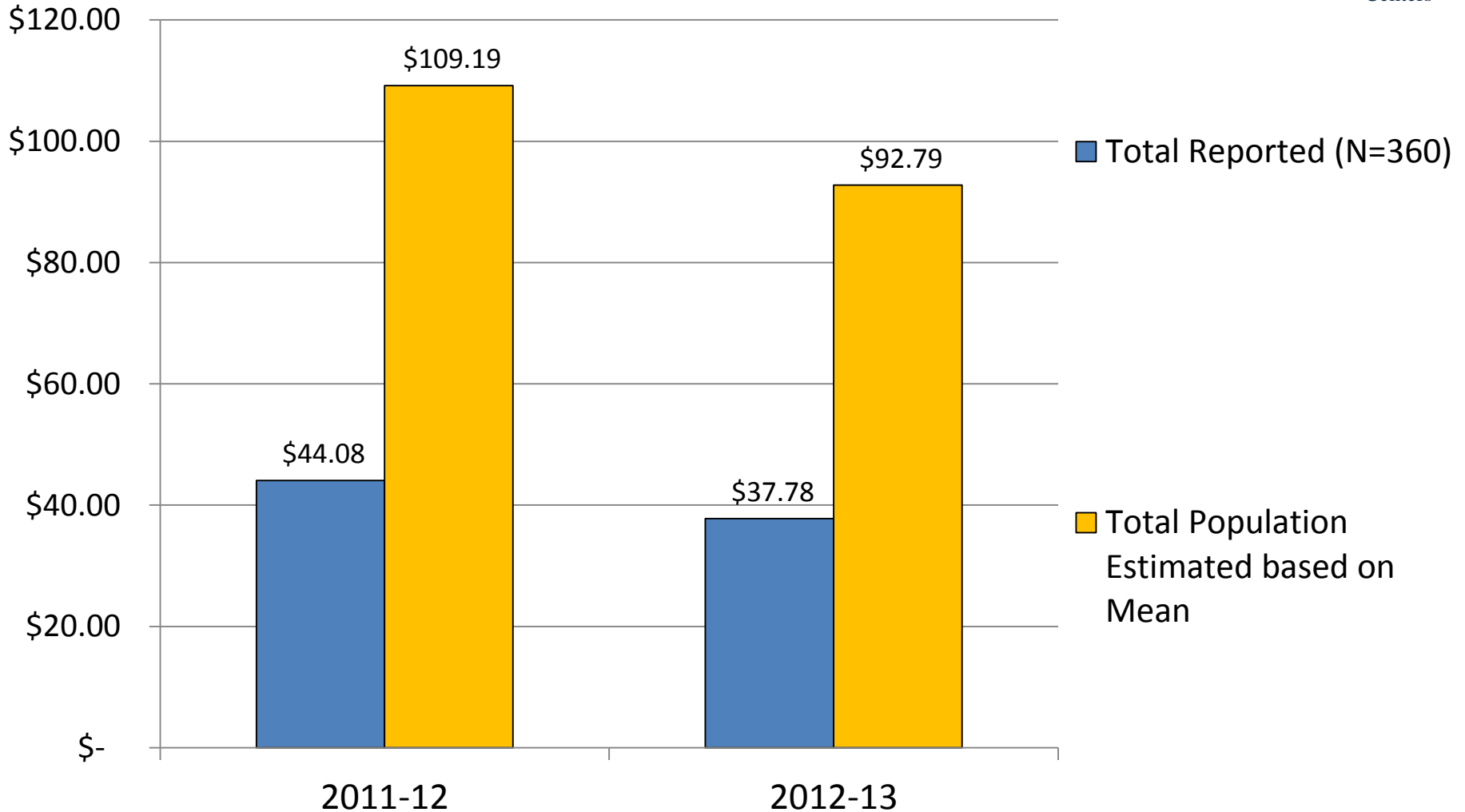
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- Program-wide center-stimulated funding for 12-13 is 37.78\$ million
- There is a fundamental problem estimating both center and program-wide value of center stimulated projects
  - Response rate is running at ~40% of total population
- Our reported value is a VERY conservative estimate
  - Assumes none of the 60% non-responders invested in center stimulated projects
- Need to find a defensible approach to estimating
  - Non-responders
    - mean
    - 50% of mean

# Estimating IUCRC-Wide Follow-on Funding in Millions



# IUCRC-Wide Follow-on Funding in Millions over last two completed FYs





# Research Cost Savings

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## B. Research & Development Benefits

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	Yes		No	
	N	%	N	%
5a. During the past year, access to Center research findings and outputs has helped accelerate the pace and/or completion of some R&D projects already underway at the organization	201	52.6	181	47.4
5b. During the past year, access to Center research findings and outputs has helped the organization to decide against initiating a new project we otherwise would have conducted.	179	48.1	193	51.9
Yes to Either / No to Both	239	64.3	133	35.8



# Research Cost Savings

*If yes, taking into account personnel, facility and related costs how much would you estimate these accelerated AND/OR avoided project(s) would have cost your organization.*

<b>Member Level Scores</b>	<b><u>Member Level</u></b>		
	<b>Mean</b>	<b>Median</b>	<b>S.D.</b>
a. \$ value of accelerated/avoided projects (thousands) per respondent org. <i>Sample: all respondents: N of respondents = 360 ; N of Centers= 50</i>	127.26	50.00	208713

<b>Center Level Scores</b>	<b><u>Center Level</u></b>		
	<b>Mean</b>	<b>Median</b>	<b>S.D.</b>
b. \$ value of accelerated/avoided projects (thousands) per center <i>Sample: all respondents: N of respondents = 360 ; N of Centers= 50</i>	916.28	700.00	758.34

<b>Program Level Scores</b>	<b><u>Program Level</u></b>		
c. Total \$ value of accelerated/avoided projects supported by respondent orgs. <i>Sample: all respondents: N of respondents = 360 ; N of Centers= 50</i>	\$45,814,000		

*\* It is worth noting that since only 39.77% of all members completed the questionnaire; this is a very conservative estimate of the value of accelerated/avoided projects supported by members.*



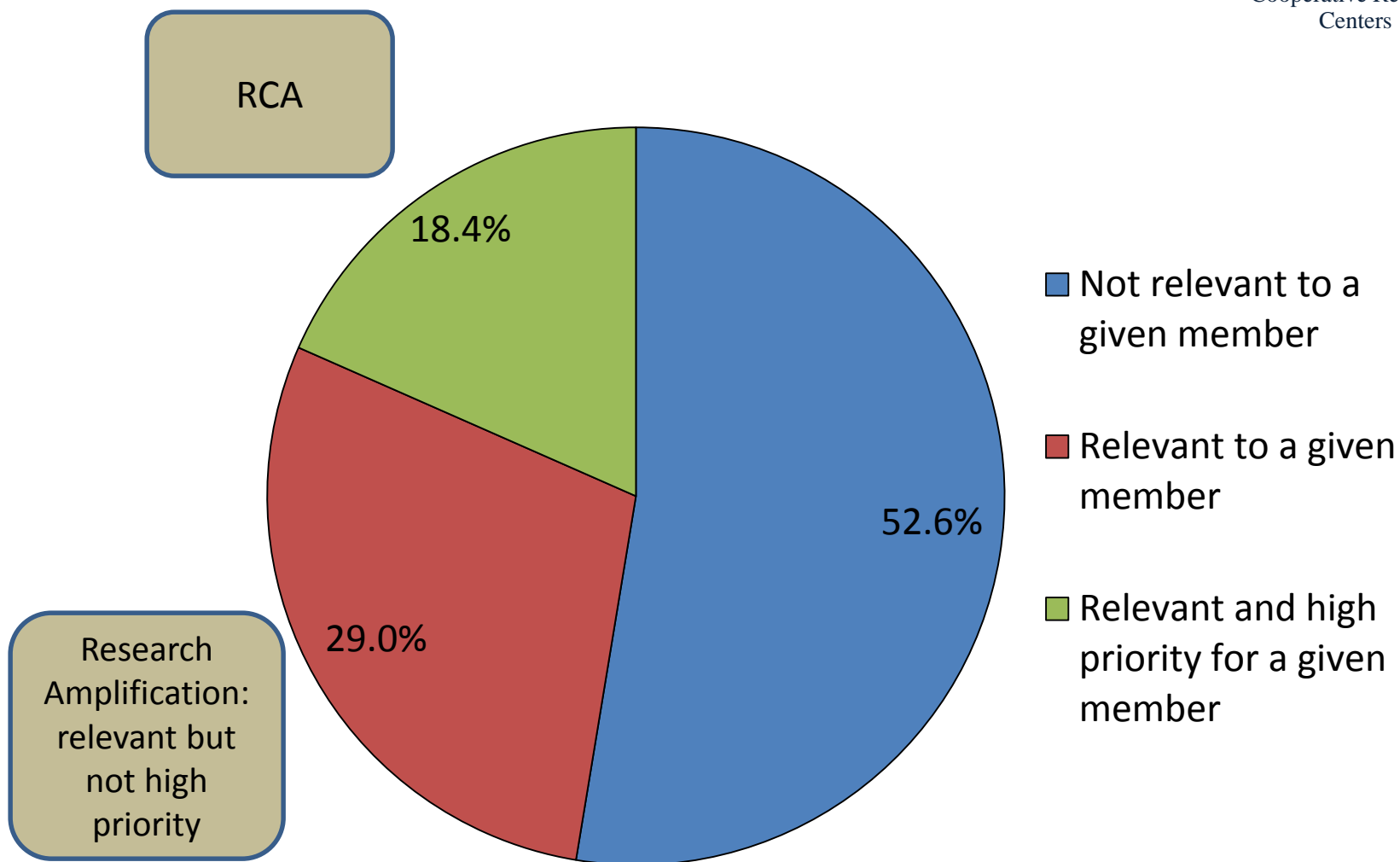
# Research Cost Avoidance

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- Definition: *Research cost avoidance is savings a firm obtains by having “necessary” research projects performed by a center rather than performing them internally.*
- Example: If a firm reports that a particular “necessary” project would cost \$100,000 to carry out internally (counterfactual estimate) but that project was actually carried out by a center to which they pay a \$50,000 membership fee that firm has avoided \$50,000 of R&D costs.



# Member Evaluation of Center Projects





# Research Cost Avoidance

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- Calculation:

- $RCA = \sum C_f - C_c$ .

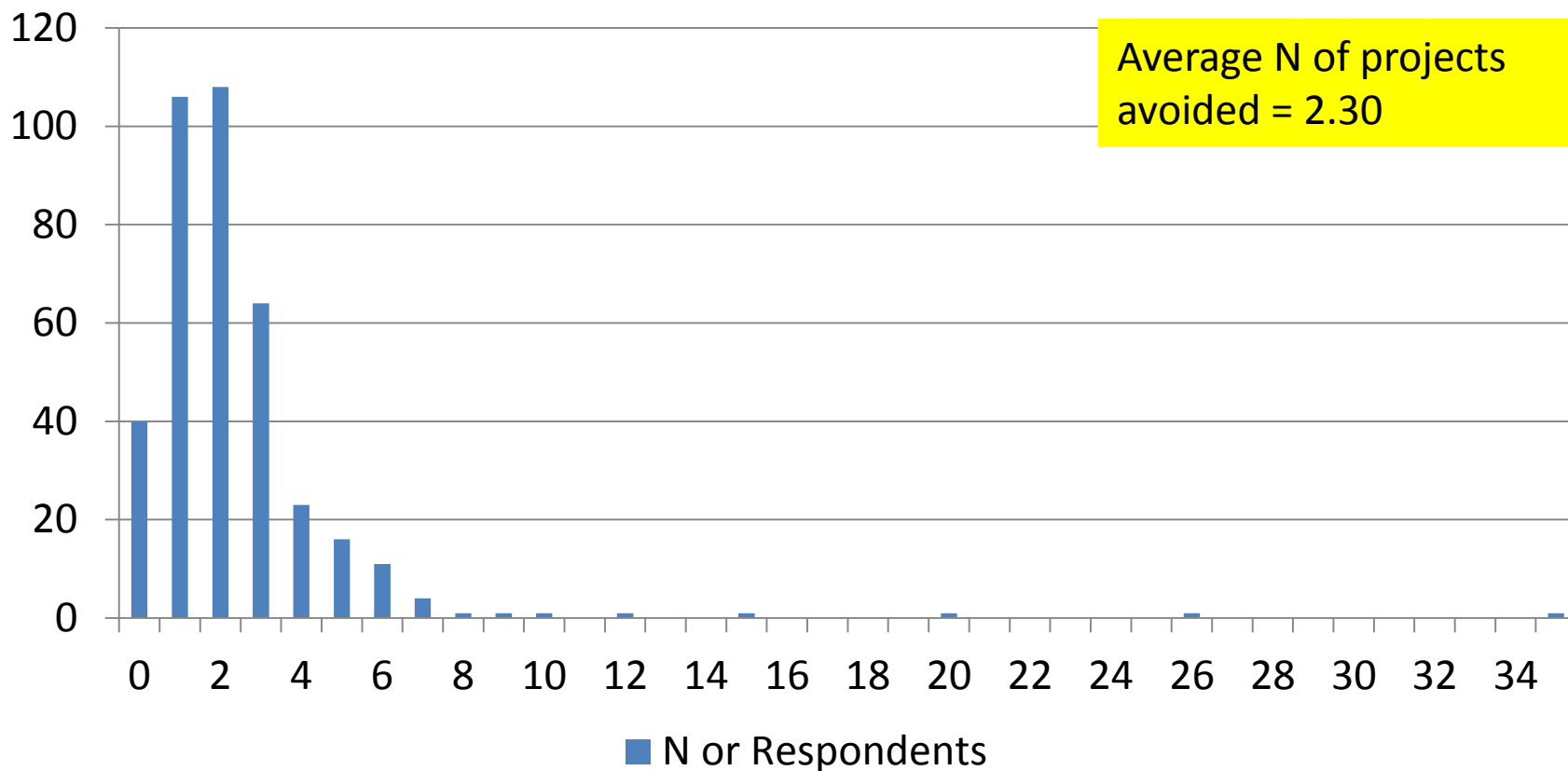
- Firm cost ( $C_f$ ) is calculated as follows:  $C_f = N_{projects} \times N_{sm} \times C_{sm}$ .

- $N_{projects}$  = number of center projects a firm considers “high enough priority they would have conducted them internally or by contract” (Q1b)
  - $N_{sm}$  = how many scientist months those projects would take to complete. (Q1c1)
  - $C_{sm}$  = the cost of a scientist month (archival)
    - (Salary (\$88.5k) + Fringe (35%) + indirect (50%)) / 12 = \$14,939
  - $C_c$  = average cost of center membership

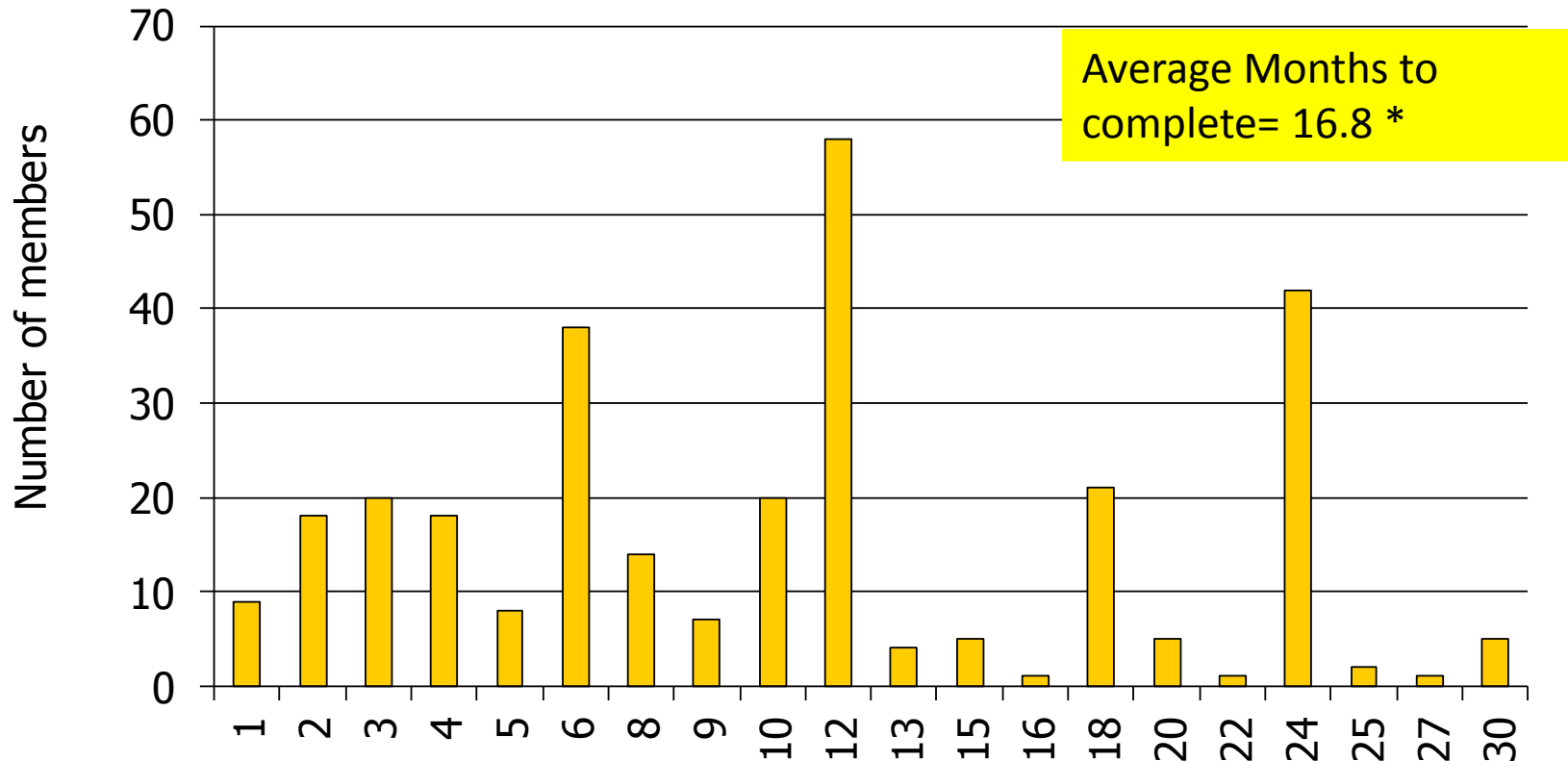


# RCA Findings

## N of Projects Avoided



# N of months to complete a typical center project: FY 2012-2013



\*Larger than in 2011-2012 (M=13). Some members indicated N of months for a team of scientists, not an individual scientist, as their typical project requires more than one person to complete.



# RCA Findings

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## Average Research Cost Avoidance (RCA)

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Member Level Scores	Mean	Median	S.D.
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a. Average dollar value (in thousands) of avoided projects per respondent organization

Av.RCA member = (N of projects * N of months * Average salary per month) – Primary Fee	571.17	245.16	113.61*
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*Sample: N of respondents = 358, N of centers = 50*

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Center Level Scores	Mean	Median	S.D.
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b. Average dollar value (in thousands) of avoided projects per respondent organization

	4089.61	3374.99	3777.81
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*Sample: N of respondents = 358, N of centers = 50*

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Program Level Scores	Sum
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c. Total dollar value of avoided projects by respondent organizations

	\$219,902,286
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RCA program = Av. RCA member \* N of members

*Sample: N of respondents = 385 N of centers = 51*

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# Summary of R&D Efficiency Impacts

	Member Level Mean	Center Level Mean	Program Total
Research Cost Avoidance	\$751,170	\$4,089,610	\$219,902,286
Research Cost Savings	\$127,260	\$916,280	\$45,814,000
Stimulated Research Projects	\$99,670	\$740,690	\$37,775,000

## Notes:

- Since Research Cost Avoidance and Research Cost Savings are “savings” and Stimulated Research Projects involves “costs” indices should not be added
- Since these data only involve feedback from about 40% of members they almost certainly underestimate impacts at both the Center and Program level



# Conclusions

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- Implementation of the revised questionnaire went relatively well second year in a row
  - Members were able to complete the questions (little missing data)
    - “Too early to estimate”, only serious complaint
- Have expanded our ability to quantify “R&D Efficiency” beyond “Stimulated Projects” with impressive estimates
  - Cost Avoidance
  - Cost Savings
- Provides enhanced documentation of the IUCRC impact
- RCA excel app is available to all evaluators for making it easier to calculate RCA locally
- **Use questionnaires from our website!**