Panel Discussion
NAS *Fostering Integrity in Research* Report:
NSF Perspectives

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NSF by the Numbers

93% funds research, education and related activities

$7.5B FY 2017 enacted

50,000 proposals evaluated

2,000 NSF-funded institutions

12,000 Awards funded

362,000 people NSF supported

Fund STEM education & workforce

Fund research in all S&E disciplines

223 NSF-funded Nobel Prize winners

Other than the FY 2017 enacted, numbers shown are based on FY 2016 activities.

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Responsible Conduct of Research and NSF:
Recent History

The America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act, 2009

42 USC 1862o–1.

SEC. 7009. RESPONSIBLE CONDUCT OF RESEARCH.

The Director shall require that each institution that applies for financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, and postdoctoral researchers participating in the proposed research project.

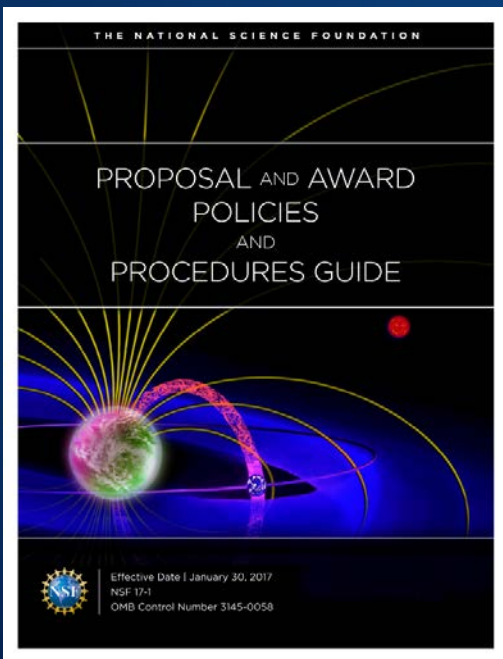**B.   Responsible Conduct of Research (RCR)**

1.   Background

The responsible and ethical conduct of research (RCR) is critical for excellence, as well as public trust, in science and engineering. Consequently, education in RCR is considered essential in the preparation of future scientists and engineers. Section 7009 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act (42 USC 1862o–1) requires that "each institution that applies for financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, and postdoctoral researchers participating in the proposed research project."
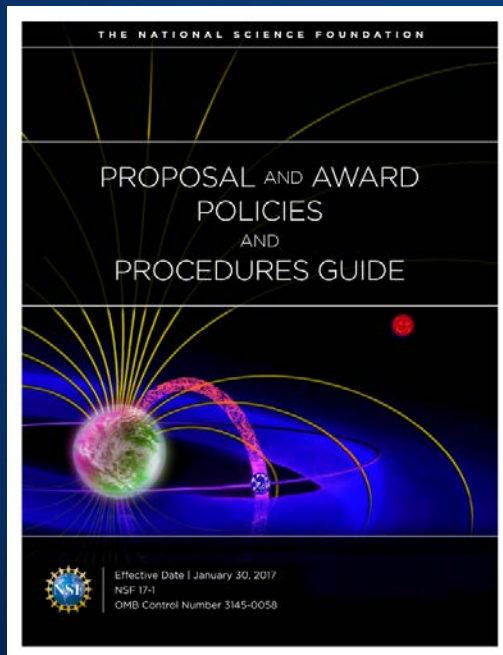
The language specified below provides NSF's implementation of Section 7009.

2.   Institutional Responsibilities

a.   An institution must have a plan in place to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students, and postdoctoral researchers who will be supported by NSF to conduct research. As noted in Chapter II.C.1.d, institutional certification to this effect is required for each proposal.

b.   While training plans are not required to be included in proposals submitted to NSF, institutions are advised that they are subject to review, upon request.

c.   An institution must designate one or more persons to oversee compliance with the RCR training requirement.

d.   Institutions are responsible for verifying that undergraduate students, graduate students, and postdoctoral researchers supported by NSF to conduct research have received training in the responsible and ethical conduct of research.

THE NATIONAL SCIENCE FOUNDATION

PROPOSAL AND AWARD POLICIES AND PROCEDURES GUIDE

Effective Date | January 30, 2017
NSF 17-1
OMB Control Number 3145-0058

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"What should be done?

Successful programs have some common features: use of case studies, interactive formats, involvement of research faculty, and clear take-home messages. Even successful programs can be reinforced with supplemental material; and online resources and tools should be identified and classified to assist academic institutions, professional associations and societies, principal investigators, and faculty, employers, and individuals to develop and implement ethics activities of all kinds. These activities can range from mentoring programs to campus-wide, multi-level educational modules to consideration of materials from symposia that can be adapted and disseminated online or at meetings of professional organizations." (p. 36)
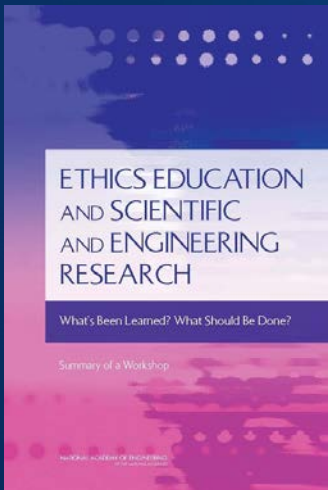
What is RCR education?

- "<u>Intervention</u> – to improve the ethical conduct of investigators" (p. 165)
- <u>Integral part of research</u> – "to ensure that the knowledge, skills, and awareness essential to responsible research are intentionally, explicitly, and accurately conveyed." (p.166)
- RCR training is most effective when it is one element in a <u>comprehensive approach</u> to improve an institution's system of research." (p. 171)

NAS: *Fostering Integrity in Research*, Committee on Responsible Science, Committee on Science, Engineering, Medicine, and Public Policy, Policy and Global Affairs, National Academy of Sciences, 2017

Continuing Issues in RCR Education:
A Problem in Education Research and Practice

- Clarity of goals and objectives
- Formats, curriculum, instruction and educational approaches
- Connecting objectives to goals to education to outcomes
- Differences across disciplines, groups of learners
- Assessment of outcomes and impacts of RCR education
- Communication of "best practices" and findings and their use

Drawing on *Fostering Integrity in Research*, Committee on Responsible Science, Committee on Science, Engineering, Medicine, and Public Policy, Policy and Global Affairs, National Academy of Sciences, 2017

NSF Program: Cultivating Cultures for Ethical STEM: NSF 15-528

... funds research projects that identify factors that are efficacious in the formation of ethical STEM researchers ... research that explores the following: 'What constitutes ethical STEM research and practice, and which cultural and institutional contexts promote ethical STEM research and practice and why?' Factors one might consider include: honor codes, professional ethics codes and licensing requirements, an ethic of service and/or service learning, life-long learning requirements, curricula or memberships in organizations (e.g. Engineers without Borders) that stress social responsibility and humanitarian goals, institutions that serve underrepresented groups, institutions where academic and research integrity are cultivated at multiple levels, institutions that cultivate ethics across the curriculum, or programs that promote group work, or do not grade. .....

NSF Program: Cultivating Cultures for Ethical STEM: NSF 15-528

... Do certain labs have a 'culture of academic integrity'? What practices contribute to the establishment and maintenance of ethical cultures and how can these practices be transferred, extended to, and integrated into other research and learning settings? Successful proposals typically have a comparative dimension, either between or within institutional settings that differ along these or other factors.

CCE STEM research projects will use basic research to produce knowledge about what constitutes responsible or irresponsible, just or unjust scientific practices and sociotechnical systems, and how to best instill students with this knowledge.

AwardNumber	Title	NSFOrgan	StartDate	LastAmendment	State	Organization	EndDate	AwardedAmou	OrganizationCity
1355547	Becoming the Online Resource Center for Ethics Education in Engineering and Science	SES	02/01/2014	01/24/2017	DC	National Academy of Sciences	01/31/2019	$1,499,905.00	Washington
1354100	Research in the Origins and Development of Modern Cartography	SES	09/01/2014	09/14/2016	WI	University of Wisconsin-Madison	08/31/2019	$448,621.00	MADISON
1449479	Collaborative Research: Foundations of Social and Ethical Responsibility Among Undergraduate Engineering Students: Comparing Across Time, Institutions, and Interventions	SES	05/15/2015	08/23/2016	IN	Purdue University	04/30/2020	$282,915.00	West Lafayette
1647505	Qualitative Research Ethics in the Big-Data Era	SES	07/15/2016	12/19/2016	PA	Pennsylvania State Univ University Park	06/30/2018	$59,630.00	UNIVERSITY PARK
1635887	Standard: Student Learning Regarding Personal, Social and Professional Responsibility	SES	08/01/2016	07/27/2016	NY	Rensselaer Polytechnic Institute	07/31/2021	$350,000.00	Troy
1635656	Educating Young Researchers in Environment Ethics	SES	08/15/2016	09/08/2016	NY	Columbia University	07/31/2019	$399,980.00	NEW YORK
1635554	Institutional Transformation: The Role of Service Learning and Community Engagement on the Ethical Development of STEM Students and Campus Culture	SES	09/01/2016	09/15/2016	GA	Georgia Tech Research Corporation	08/31/2021	$599,720.00	Atlanta
1636383	Collaborative Research: Standard: Institutional Cultures of Ethical Practice in University-Based Engineering-for-Development Programs	SES	09/01/2016	09/01/2016	WA	University of Washington	08/31/2019	$64,751.00	Seattle
1634202	CCE STEM: Standard: Collaborative Research: The Development of Ethical Cultures in Computer Security Research	SES	09/01/2016	08/31/2016	WA	University of Washington	08/31/2020	$336,058.00	Seattle
1655388	Positive Research Integrity	SES	09/01/2016	08/10/2016	IN	University of Notre Dame	08/31/2017	$48,124.00	NOTRE DAME
1635661	Standard Proposal: Building a Culture of Responsible Research and Practice in STEM	SES	09/01/2016	09/19/2016	IL	Illinois Institute of Technology	08/31/2019	$335,800.00	Chicago
1636349	Collaborative Research: Standard: Institutional Cultures of Ethical Practice in University-Based Engineering-for-Development Programs	SES	09/01/2016	09/01/2016	CO	University of Colorado at Boulder	08/31/2019	$317,913.00	Boulder
1634509	CCE STEM: Standard: Collaborative: The Development of Ethical Cultures in Computer Security Research	SES	09/01/2016	08/31/2016	MD	University of Maryland College Park	08/31/2020	$163,768.00	COLLEGE PARK

In conclusion:

- Congratulations on the *Fostering Integrity in Research* report
- Appropriate for the science community to take leadership
- Interested in how NSF can play appropriate role
- Suggestion: step up focus on the design, delivery, and evaluation of RCR education
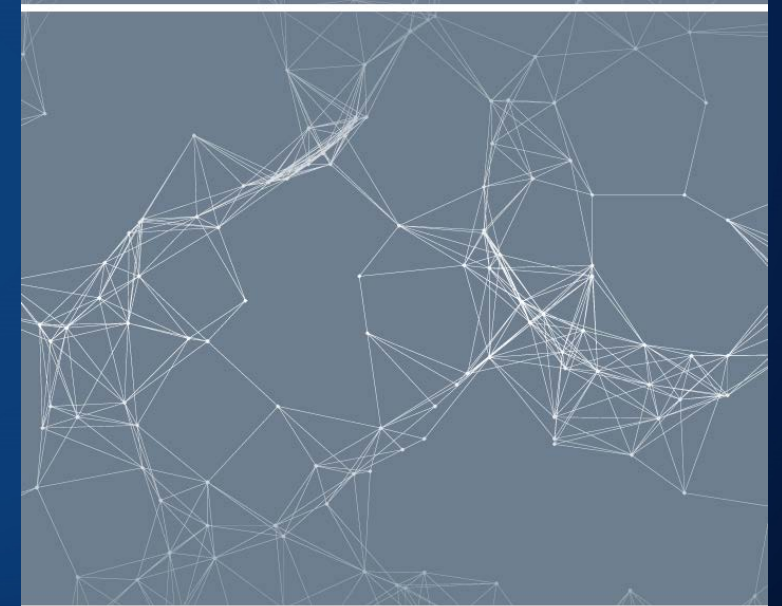
THANKS!

INVESTIGATIVE OUTCOMES[37]

Total RM Findings

FY[38]	P	Fab/Fal	Multi[39]	Total	Included Debarment[40]
2005	4	3	1	8	2
2006	5	1	0	6	1
2007	11	1	0	12	5
2008	9	3	0	12	5
2009	16	0	1	17	5
2010	9	2	0	11	2
2011	14	3	0	17	5
2012	18	0	0	18	2
2013	13	3	0	16	6
2014	19	7	0	26	7
2015	9	2	0	11	6
2016	11	4	0	15	3
1st half 2017	3	3	0	6	0
Totals	**141**	**32**	**2**	**175**	**49**

OCTOBER 1, 2016 — MARCH 31, 2017

SEMIANNUAL REPORT
TO CONGRESS

NATIONAL SCIENCE FOUNDATION | OFFICE OF INSPECTOR GENERAL