

A Recent NSF Program Officer's Experience, Tips, and Advice for Preparing Proposals



Bruce J. MacFadden

Florida Museum of Natural History

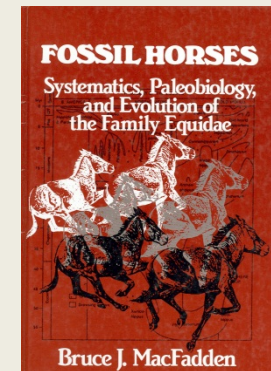


Outline

- My background
- Funding and structure of NSF
- Trends and tips
- Broader Impacts
- Discussion of your questions

My background

- STEM --geology, biology, paleontology
- UF faculty since 1977; Curator at FLMNH
- Research: fossil horses, and what they teach us about evolution
- Very interested in education & outreach
- Do PD & teach a course on “Broader Impacts”
- “Rotator” PO at NSF from July 2009-July 2010
- Current PI/PD on recently funded Panama PIRE



Cambridge U Press
1992

NSF

- 2011 6+ Billion dollar budget; 2,000 staff
- Part of President's Office
- Advised by National Science Board
- ~45,000 proposals, ~10,000 funded
- Administrative units (Director, PR, HR, OGC, DGA, etc.)
- ~7 Research & Related Activities Directorates (BIO, CISE, ENG, GEO, MPS, OPP, SBE)
- Cross-cutting Divisions (Integrative, OISE)

EHR (Education and Human Resources) Directorate 4 Divisions

- DUE (Division of Undergraduate Education)--
REUs
- DGE (Division of Graduate Education)—IGERTs,
GK-12s
- HRD (Human Resource Development),
ADVANCE
- DRL (Division of Research on Learning), DRK-12,
ITEST

My responsibilities

- Assigned proposals & panels in my “Lifelong Learning” cluster, assisted with other panels (DRK-12, CAREER, SMP, GEOED, 2 off-site STCs)
- Also primary PO for Communicating Research to Public Audiences (CRPAs)
- Primary assignment was to Informal Science Education (Lifelong Learning Cluster)

Informal science education:

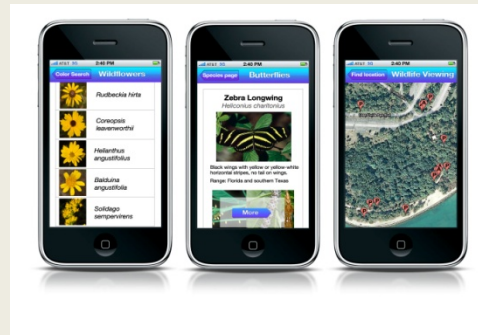
Free-choice, Lifelong learning, “K to Gray” (out of school)

- Museums, science centers, nature centers
- Zoos, botanical parks, aquaria
- Community activities (citizen scientists)
- Movies, documentaries
- Gaming, cyberlearning, virtual reality via 2.0
- Radio and TV delivery
- Others, including...

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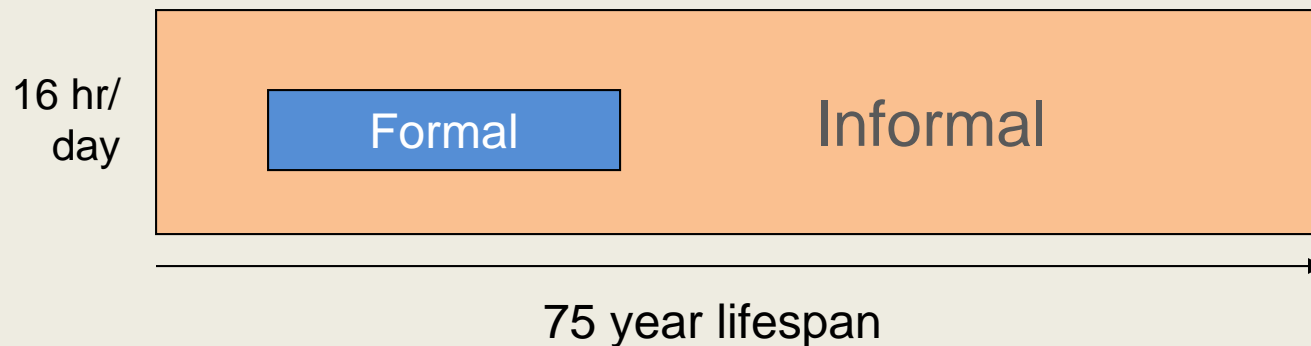


Potential impact of ISE (Informal Science Education)

- Formal and informal education
- What percentage of a person's (US) waking hours during their lifetime is spent in formal education?

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CRPA (Communicating Research to Public Audiences) Specifics

- \$150 K “supplements,” commensurate with size of active award
- Promote **research** discoveries to public (informal) audiences
- PI on R & RA award is PI on CRPA
- Funding for up to 24 months (some overlap required)
- No deadlines; 6-month turn-around
- 15 page project description, etc.
- Submitted to ISE (10-565)

Selected examples of recent CRPAs (2008)

Aiming High: Probing the Mystery of Ultra-High Energy Cosmic Rays (MPS)	Olinto
Regenerative Technologies in the Future: Tissue Engineering and Organ Printing (BIO)	Forgacs
HAWAII'S Volcanoes: A Media Project (GEO)	DePaolo
Community of Soundscapes - Expanding Environmental Awareness through Capture and Sharing of Sonic Experiences (CISE)	Giaccardi
Evolution in a Vortex: Public Outreach on Freshwater Science in the Congo River (BIO)	Stiassny
Genes to Ecosystems (BIO)	Whitham
CRPA Biographical Videos of Black, Hispanic, and Native American Female Faculty: Voices of the Few (EHR)	Nelson
ARS Synthetica - A Multimedia Forum Exploring the Artful Design of Living Things (BIO)	Keasling

CRPAs--Recap & Reflections

- CRPAs are “one of the best kept secrets” at NSF
- They can help you do Broader Impacts
- Common pitfalls of CRPAs, STEM scientists don't understand:
 - Target audiences
 - Deliverables
 - Evaluation
 - Education projects (find partners)

NSF Trends (one PO's anecdotal view)

- Little growth in “standard” single-investigator (or collaborative awards)
- No/little growth in across-the-board funding increases
- New monies & increases in large integrated projects
- Integration of technology, internationalization
- President's priorities (e.g., climate change)


“TIPS”

- Read the “solicitation” (e.g., 10-565)
- Make sure your project fits
- Follow the guidelines
- If you have questions, communicate with the PO
- Write to your audience and solicitation
- Compliance—e.g., postdoctoral mentoring, page limits, etc. (no RWR)
- Have your proposal reviewed, if time
- Take Broader Impacts seriously and be innovative
- Sign up a few days early in Fastlane and start uploading as files are ready; don’t be late.

Informal Science Education (ISE)

PROGRAM SOLICITATION
NSF 10-565

REPLACES DOCUMENT(S):
NSF 09-553

 National Science Foundation
Directorate for Education & Human Resources
Research on Learning in Formal and Informal Settings

Preliminary Proposal Due Date(s) (required) (due by 5 p.m. proposer's local time):
July 22, 2010
except CRPA proposals (which do not require preliminary proposals)

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):
December 07, 2010
except CRPA proposals (which do not have deadlines)

IMPORTANT INFORMATION AND REVISION NOTES

What will happen when your proposal is submitted via Fastlane?

- Sent out for review (at least 3)
- Recommendations by ad hocs and/or panel
- All proposals are reviewed based on two criteria
 - Intellectual Merit
 - Broader Impacts
- Within this criteria, some programs will have additional, specific things to address in PD
- You should hear within 6 months; rarely much sooner (unless RWR)

Broader Impacts: Background & perspective

- Since 2002 NSF now evaluates proposals on 2 fundamental criteria
 - Intellectual merit
 - Broader impacts

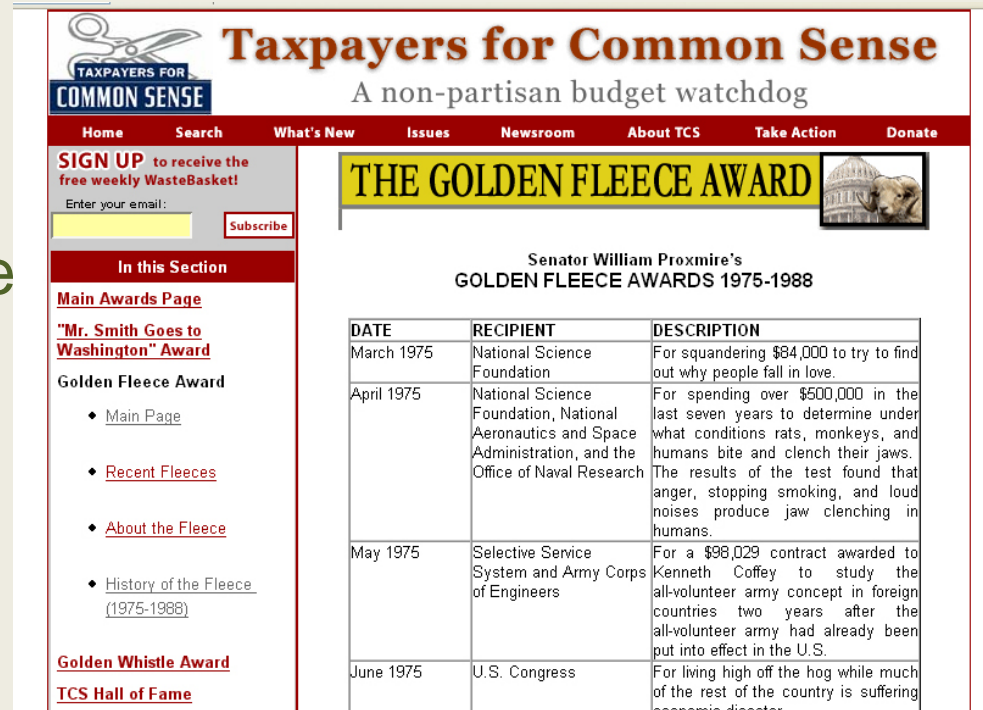
“...many proposers have difficulty undertaking how to frame the broader impacts of the activities they propose to undertake”

Why is it so difficult?

- Prior to 2002, no expectation of broader impacts in NSF proposals
- No training or experience for proposers
- For “basic sciences” focus has been on “Ivory Tower” research
- No academic culture exist(ed) for embracing broader impacts

The roots of broader impacts, 1

- Public scrutiny of government-funded research
- “Proxmire Golden Fleece Awards” in 1970s—science taken out of context



The screenshot shows the website for Taxpayers for Common Sense, a non-partisan budget watchdog. The page features a navigation menu with links for Home, Search, What's New, Issues, Newsroom, About TCS, Take Action, and Donate. A prominent yellow banner reads "THE GOLDEN FLEECE AWARD" with an image of a sheep. Below the banner, the text identifies the awards as "Senator William Proxmire's GOLDEN FLEECE AWARDS 1975-1988". A table lists several awards, including one for the National Science Foundation in March 1975 for squandering \$84,000, and another for the National Science Foundation, National Aeronautics and Space Administration, and the Office of Naval Research in April 1975 for spending over \$500,000. A sidebar on the left contains a "SIGN UP" form, a "Subscribe" button, and a list of links under "In this Section", including "Main Awards Page", "Mr. Smith Goes to Washington Award", "Golden Fleece Award" (with sub-links for Main Page, Recent Fleecees, About the Fleece, and History of the Fleece), "Golden Whistle Award", and "TCS Hall of Fame".

TAXPAYERS FOR COMMON SENSE
Taxpayers for Common Sense
A non-partisan budget watchdog

Home Search What's New Issues Newsroom About TCS Take Action Donate

SIGN UP to receive the free weekly WasteBasket!
Enter your email:

In this Section

[Main Awards Page](#)
["Mr. Smith Goes to Washington" Award](#)

Golden Fleece Award

- [Main Page](#)
- [Recent Fleecees](#)
- [About the Fleece](#)
- [History of the Fleece \(1975-1988\)](#)

[Golden Whistle Award](#)
[TCS Hall of Fame](#)

THE GOLDEN FLEECE AWARD

Senator William Proxmire's
GOLDEN FLEECE AWARDS 1975-1988

DATE	RECIPIENT	DESCRIPTION
March 1975	National Science Foundation	For squandering \$84,000 to try to find out why people fall in love.
April 1975	National Science Foundation, National Aeronautics and Space Administration, and the Office of Naval Research	For spending over \$500,000 in the last seven years to determine under what conditions rats, monkeys, and humans bite and clench their jaws. The results of the test found that anger, stopping smoking, and loud noises produce jaw clenching in humans.
May 1975	Selective Service System and Army Corps of Engineers	For a \$98,029 contract awarded to Kenneth Coffey to study the all-volunteer army concept in foreign countries two years after the all-volunteer army had already been put into effect in the U.S.
June 1975	U.S. Congress	For living high off the hog while much of the rest of the country is suffering economic disaster.

The Roots of Broader Impacts, 2

- More recently—Demands by Congress on NSF to make research relevant and/or understood
- We are currently in a culture where “public understanding of science” is critical
- For example, “hot topics” in science currently include evolution, climate change, and stem cell research
- Public misunderstanding of these can result from poor communication of scientists to society.

An anecdote, or two*

- The 11th hour request
- “End of grant and we are out of money” request

*AKA, how not to be like the older generation

More important than writing a paper



It might lead you to new research questions



“Skeletons in Our Closet” exhibit, ca. 2000

EAR 0418042—“Macroevolution and geochemistry of Cenozoic giant sharks”



\$2K per year included in budget
For BI activities; plan to submit
A CRPA



CRPA—*Megalodon: Largest shark that ever lived*

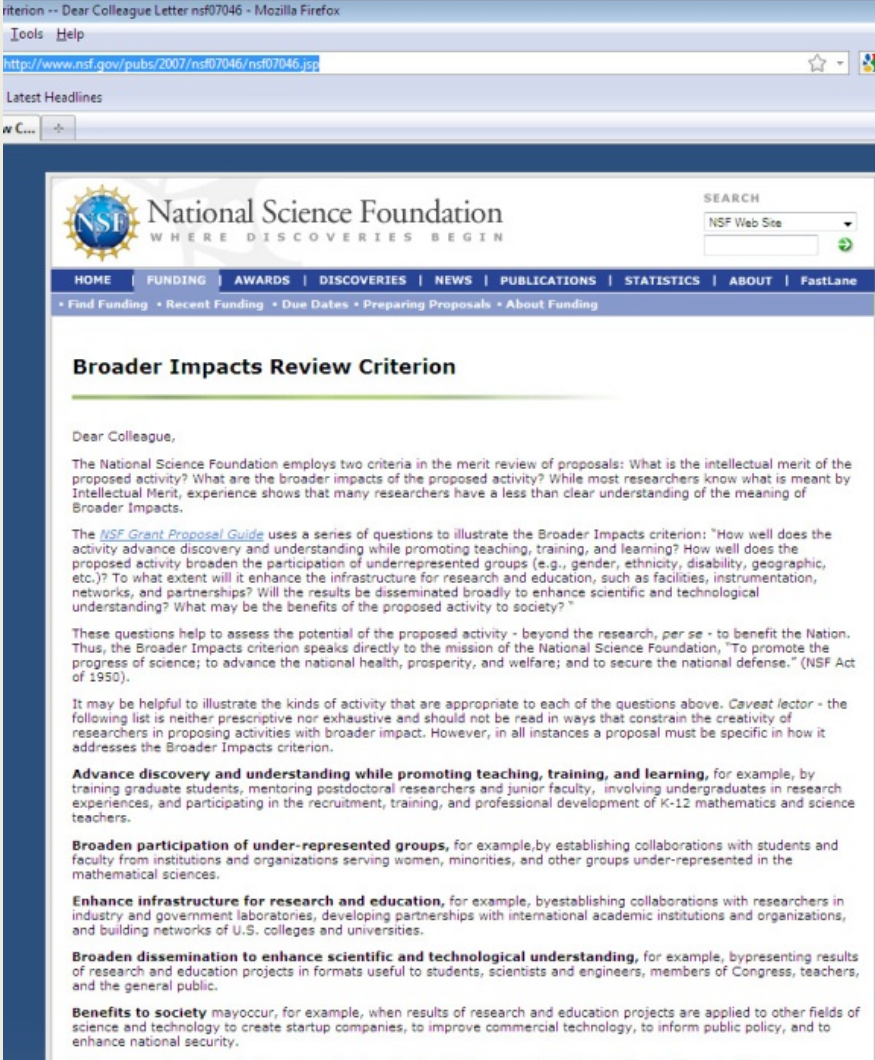


- Opened June 2007; ~100,000 visitors during 6 month venue
- Has been featured at venues in FL, HI, VA, MS: ultimately through 2013
- Projected > 1 million visitors during five-year exhibit life-time; how does this impact compare with your peer-reviewed articles?

*ESI 0628810, MacFadden (PI/PD)

NSF BI document July 2007*

1. Advance discovery and understanding while promoting teaching, training, and learning
2. Broaden participation of underrepresented groups
3. Enhance infrastructure for research and education
4. Broad dissemination to enhance scientific and technological understanding
5. Benefits to Society



The screenshot shows a Mozilla Firefox browser window displaying the NSF website. The address bar shows the URL <http://www.nsf.gov/pubs/2007/nsf07046/nsf07046.jsp>. The page content includes the NSF logo and navigation menu. The main heading is "Broader Impacts Review Criterion". The text begins with "Dear Colleague," and explains the NSF's two criteria for proposal review: intellectual merit and broader impacts. It references the NSF Grant Proposal Guide and lists five key areas of focus: advance discovery and understanding while promoting teaching, training, and learning; broaden participation of under-represented groups; enhance infrastructure for research and education; broad dissemination to enhance scientific and technological understanding; and benefits to society.

riterion -- Dear Colleague Letter nsf07046 - Mozilla Firefox
Tools Help
<http://www.nsf.gov/pubs/2007/nsf07046/nsf07046.jsp>
Latest Headlines
v C...
National Science Foundation
WHERE DISCOVERIES BEGIN
SEARCH
NSF Web Site
HOME | FUNDING | AWARDS | DISCOVERIES | NEWS | PUBLICATIONS | STATISTICS | ABOUT | FastLane
• Find Funding • Recent Funding • Due Dates • Preparing Proposals • About Funding
Broader Impacts Review Criterion
Dear Colleague,
The National Science Foundation employs two criteria in the merit review of proposals: What is the intellectual merit of the proposed activity? What are the broader impacts of the proposed activity? While most researchers know what is meant by Intellectual Merit, experience shows that many researchers have a less than clear understanding of the meaning of Broader Impacts.
The [NSF Grant Proposal Guide](#) uses a series of questions to illustrate the Broader Impacts criterion: "How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?"
These questions help to assess the potential of the proposed activity - beyond the research, *per se* - to benefit the Nation. Thus, the Broader Impacts criterion speaks directly to the mission of the National Science Foundation, "To promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense." (NSF Act of 1950).
It may be helpful to illustrate the kinds of activity that are appropriate to each of the questions above. *Caveat lector* - the following list is neither prescriptive nor exhaustive and should not be read in ways that constrain the creativity of researchers in proposing activities with broader impact. However, in all instances a proposal must be specific in how it addresses the Broader Impacts criterion.
Advance discovery and understanding while promoting teaching, training, and learning, for example, by training graduate students, mentoring postdoctoral researchers and junior faculty, involving undergraduates in research experiences, and participating in the recruitment, training, and professional development of K-12 mathematics and science teachers.
Broaden participation of under-represented groups, for example, by establishing collaborations with students and faculty from institutions and organizations serving women, minorities, and other groups under-represented in the mathematical sciences.
Enhance infrastructure for research and education, for example, by establishing collaborations with researchers in industry and government laboratories, developing partnerships with international academic institutions and organizations, and building networks of U.S. colleges and universities.
Broaden dissemination to enhance scientific and technological understanding, for example, by presenting results of research and education projects in formats useful to students, scientists and engineers, members of Congress, teachers, and the general public.
Benefits to society may occur, for example, when results of research and education projects are applied to other fields of science and technology to create startup companies, to improve commercial technology, to inform public policy, and to enhance national security.

*<http://www.nsf.gov/pubs/2007/nsf07046/nsf07046.jsp>

1. Advance discovery and understanding while promoting teaching, training, and learning

- Integrate research into your teaching
- Include and mentor students
- Recruit and train teachers
- Develop innovative pedagogy
- Promote other researchers and graduate students to do the same

2. Broaden participation of underrepresented groups

- Target audiences
- Promote research and educational collaborations
- Involve other non-Ph.D.-granting institutions
- Conferences and activities where diversity is a priority
- Mentor young faculty



3. Enhance infrastructure for research and education

- Partner with other institutions and organizations, both within US and internationally
- Stimulate, develop, and support next generation research instrumentation and multi-user facilities and platforms
- Upgrade computer infrastructure
- Develop activities that engage large numbers of science students

4. Broad dissemination to enhance scientific and technological understanding

- Partner with museums to develop exhibits
 - Real exhibits
 - cyberexhibits
- Give science presentations to broader community, including public and policy-makers
 - Local interest clubs
 - teachers
- Publish in diverse media to reach broader audiences (e.g., *Natural History* magazine)
- Work on a documentary, You-tube, etc.

5. Benefits to Society

- Demonstrate linkages between discovery and societal benefit (e.g., stem-cell research)
- Partner with government agencies and private sector to integrate research into activities of mutual interest
- Present research and education results in formats understandable to non-scientists
- Provide information for policy formulation by Federal, State, or local agencies

Bottom line recommendations

- Broader impact activities should be integral to project from the beginning
- Can't do them all—do those that make sense to your project
- Enjoy these activities—they will provide “pay back” more than you can realize



Why should we care?--Because



- NSF and Congress care (\$)
- No more “Golden Fleece” awards
- Its the right thing to do for society
- It might lead you to new research questions
- It will help you with the current culture of science and society

Take-home messages

- Think outside the box about funding opportunities.
- There are no secrets of how to succeed with a NSF proposal
- Its lots of hard work, mostly objective process
- Don't be afraid of Broader Impacts

Questions and discussion?