



National Science Foundation
WHERE DISCOVERIES BEGIN

NSF Merit Review Process and Research Proposal Preparation

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Outline

- Proposal review process
 - Submission
 - Administrative Review
 - Merit Review
 - Decisions
- Proposal preparation
- Hints on proposal writing
- “10 Fatal Flaws”



Proposal Submission



- How?
 - Via FastLane (<https://www.fastlane.nsf.gov>) or Grants.gov (<http://www.grants.gov>)
- Who?
 - Universities and colleges
 - Non-profit, non-academic organizations
 - For-profit organizations
 - State and local governments
- To whom are proposals submitted?
 - Program Descriptions, Program Announcements, Dear Colleague Letters, and Program Solicitations
- What?
 - Basics of Proposal Types
- When?
 - Target date, deadline and window



Proposal Submission - To whom?

Categories of Funding Opportunities

- Program Description
 - broad, general descriptions of programs
 - usually the home for investigator-initiated unsolicited proposals
- Program Announcement
 - similar to Program Descriptions
- Dear Colleague Letter
 - provides general information to community, clarifies or amends existing policy or document, or informs community about upcoming opportunities or special competitions for supplements to existing awards
- Program Solicitation
 - encourage submission of proposals in specific program areas of interest to NSF
 - more focused; normally apply for limited period of time
 - may include additional review criteria and reporting requirements, budgetary and eligibility limits, require letters of intent or pre-proposals, etc.



Proposal Submission - What?

- Letters of Intent
 - Only if needed by the program
 - Intent: to help NSF program staff to gauge size and range of competition
 - Contents: PI's and co-PI's names, proposed title, list of possible participating organizations, and synopsis
 - Not externally evaluated or used to decide on funding
- Preliminary Proposal
 - Only if needed by the program
 - Intent: to reduce unnecessary effort in proposal preparation and to increase the overall quality of full submission
 - Contents: based on the program
 - Review and decisions: merit review to aid decisions
 - Invite or Not invite
 - Encourage or Not encourage
- Full Proposal
 - Typical submission to NSF



Proposal Submission - When?

Published in specific program descriptions, announcements, and solicitations

- Target dates
 - dates after which proposals still accepted, but may miss a particular panel
- Deadline dates
 - dates after which proposals will not be accepted for review
- Submission Windows
 - designated periods of time during which proposals accepted for review
- Accepted any time - After speaking with a Program Director
 - e.g. SGER (Small Grants for Exploratory Research), conference/workshop proposals, supplements

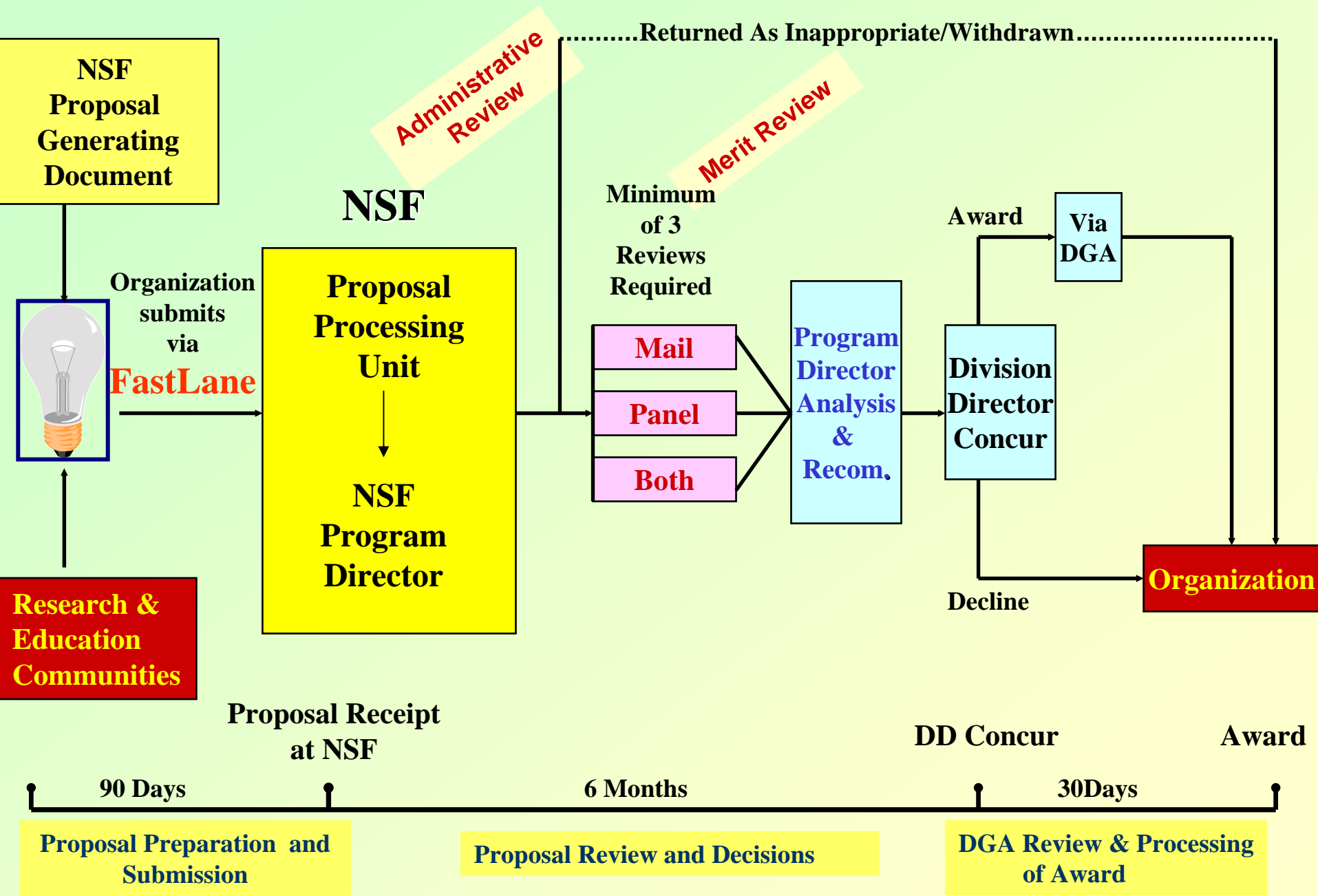


Submission and afterwards

- Plan Ahead!!
 - Don't wait until the last minute.
 - Don't count on getting a time extension
- Submission
 - Check before you submit
 - Print out from FastLane to ensure pdf conversion is correct
 - Work with your Sponsored Projects Office
- After submission
 - Acknowledgment and FastLane proposal status page
 - FastLane Proposal File Update module
 - Parts of a proposal *may* be replaced after submission
 - Don't count on this, the word is *may*, not *can*.



NSF Proposal & Award Process & Timeline



Administrative Review – Compliance Check

- ✓ Print problems, format, page limits, etc.
- ✓ Return without review
 - DOES NOT ADDRESS BOTH REVIEW CRITERIA IN PROJECT SUMMARY
 - inappropriate for funding by NSF
 - insufficient lead-time before the activity's start
 - received after announced proposal deadline date
 - full proposal submitted when preliminary proposal "not invited"
 - duplicate of, or substantially similar to, proposal already under consideration by NSF from same submitter
 - does not meet NSF proposal preparation requirements
 - not responsive to *GPG* (Grant Proposal Guide) or program announcement/solicitation
 - previously reviewed and declined and has not been substantially revised
 - duplicates another proposal already funded



NSF Merit Review

NSF invests in the best ideas from the most capable people, determined by competitive merit review.



Merit Review Criteria

The intellectual merit of the proposed activity

- Creativity and originality
- Potential to advancing knowledge and understanding within and across fields
- Conceptualization and organization
- Qualifications of investigators
- Access to resources
- The broader impacts of the proposed activity
 - Discovery while promoting teaching, training and learning
 - Participation of underrepresented groups
 - Enhancement of infrastructure for research and education
 - Dissemination of results to enhance scientific and technological understanding
 - Benefits to society
- There are NSF General statements regarding intellectual merit and broader impact, but also some Programs list examples of criteria to the program of intellectual merit and broader impact.



Merit Review

■ Mail Reviews

• Identifying reviewers:

- Reviewer suggestions by the PI
- Program Director's knowledge of what is being done and who's doing what in the research area
- References listed in proposal
- Recent technical programs from professional societies
- Recent authors in Scientific and Engineering journals
- Reviewer recommendations

■ Panel Reviews

- At least three panelists provide written reviews
- All are expected to contribute to the discussion of the proposal and its panel rating
- Research Directorates usually use large panels (e.g., 15 to 25) where all members do not write reviews while EHR usually uses smaller panels (5 to 8) where all reviewers write reviews.



Reviewer Conflicts of Interest

- Remove or limit influence of ties to an applicant institution or investigator that could affect reviewer advice
- Preserve trust of scientific community, Congress, and general public in integrity, effectiveness, and evenhandedness of NSF's merit review process
- Types of COIs:
 - Affiliations with applicant institutions
 - Relationships with investigator or project director (personal and/or professional)



Basis for decisions: Reviews

■ Merit Review

- Content of the review may be more important than the rating particularly in large panels.
- Program Director analyzes reviews.
 - Fairness
 - Substance in the reviews
 - Technical problems raised in the reviews
 - major vs. minor
 - Reasons for the reviewer concerns or enthusiasm
 - Impact of information not available to the reviewer (e.g. updates)
- Program Director sometimes obtains additional reviews or comments from the PI

■ Panel Recommendations

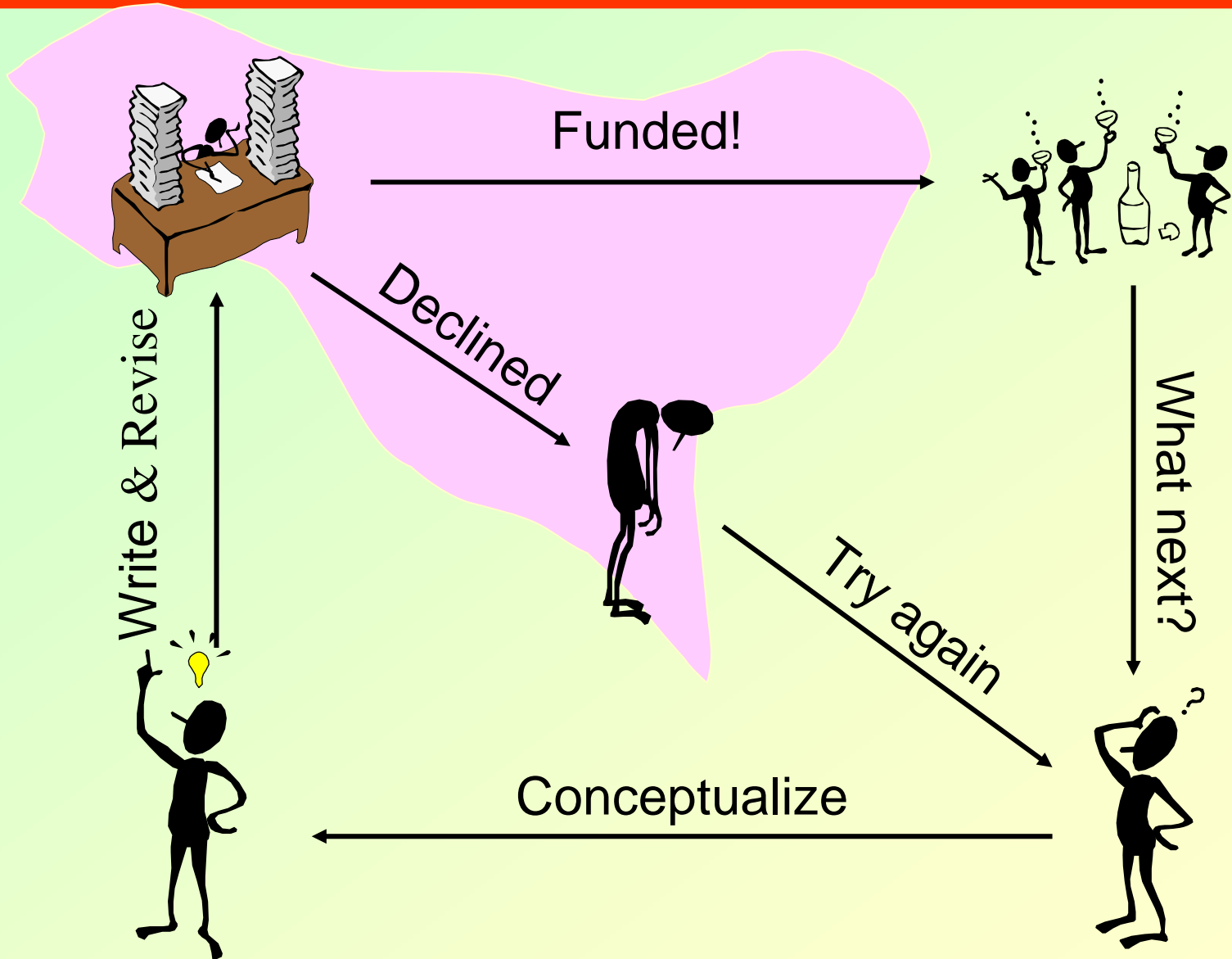


Basis for Decisions: A Balanced Portfolio

- Innovation and Creativity
 - High risk- high reward projects
- Breadth of research areas
- Priority areas and systems
- Demographics and Diversity
- Broadening participation
- Institutional impact- PUI, EPSCOR, etc.
- Integration of research & education
- International collaborations



Life Cycle of a Proposal



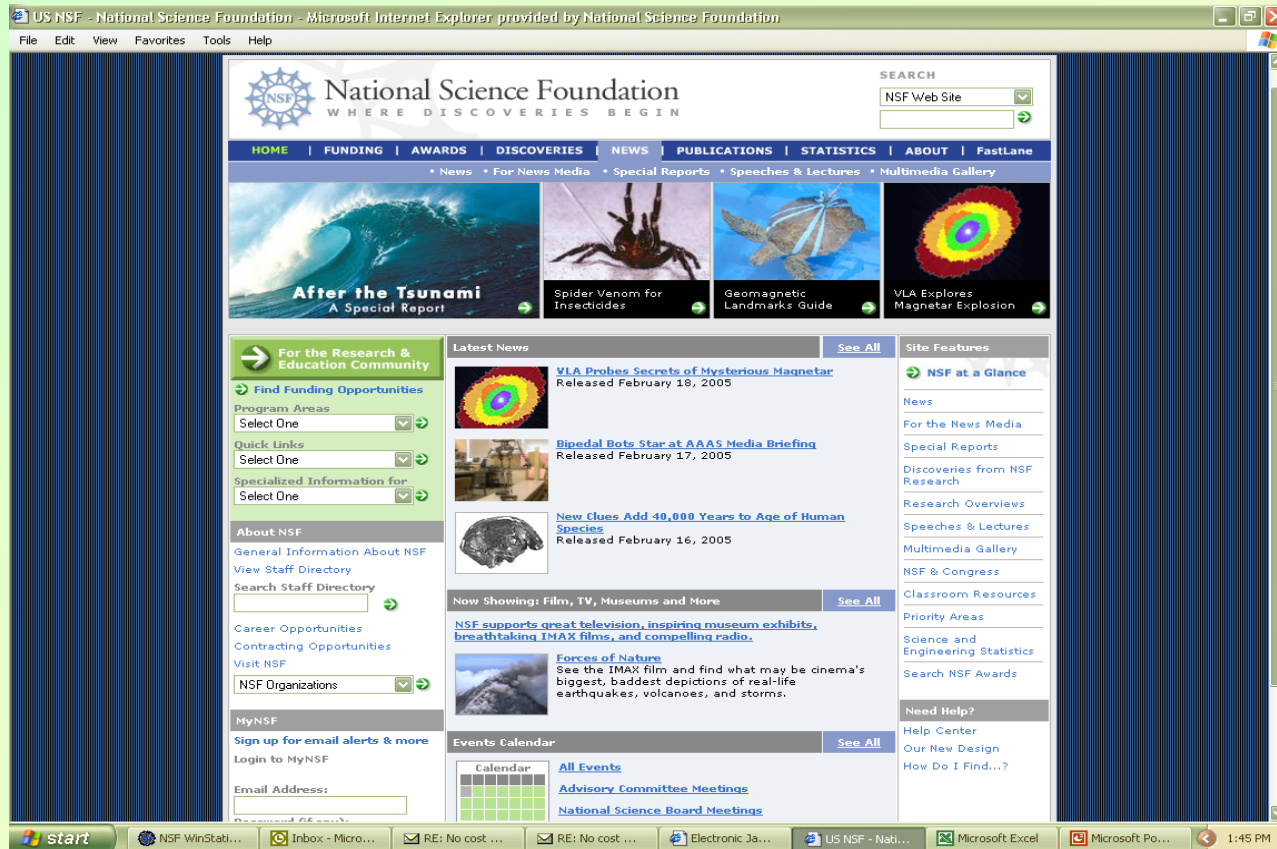
Research proposal preparation

A good proposal is a good idea, well expressed, with a clear indication of methods for pursuing the idea, evaluating the findings, making them known to all who need to know, and indicating the broader impacts of the activity.



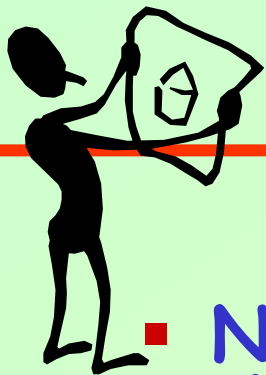
Step 1: Getting started

- There is no substitute for a cutting-edge idea!
- But you also have to write a proposal!



The screenshot shows the National Science Foundation (NSF) website as viewed in Microsoft Internet Explorer. The browser's address bar displays "US NSF - National Science Foundation - Microsoft Internet Explorer provided by National Science Foundation". The website header features the NSF logo and the tagline "WHERE DISCOVERIES BEGIN". A navigation menu includes links for HOME, FUNDING, AWARDS, DISCOVERIES, NEWS, PUBLICATIONS, STATISTICS, ABOUT, and FastLane. Below the navigation menu, there are four featured articles with images: "After the Tsunami: A Special Report", "Spider Venom for Insecticides", "Geomagnetic Landmarks: Guide", and "VLA Explores Magnetar Explosion". The main content area is divided into several sections: "For the Research & Education Community", "Find Funding Opportunities" (with dropdown menus for Program Areas, Quick Links, and Specialized Information), "About NSF", "Career Opportunities", "MyNSF", "Latest News" (with a "See All" link), "Now Showing: Film, TV, Museums and More" (with a "See All" link), and "Events Calendar" (with a "See All" link). The "Latest News" section lists three items: "VLA Probes Secrets of Mysterious Magnetar" (Released February 18, 2005), "Bipedal Bots Star at AAAS Media Briefing" (Released February 17, 2005), and "New Clues Add 40,000 Years to Age of Human Species" (Released February 16, 2005). The "Now Showing" section features a link to "NSF supports great television, inspiring museum exhibits, breathtaking IMAX films, and compelling radio." and a link to "Forces of Nature" (See the IMAX film and find what may be cinema's biggest, baddest depictions of real-life earthquakes, volcanoes, and storms.). The "Events Calendar" section includes a calendar grid and links to "All Events", "Advisory Committee Meetings", and "National Science Board Meetings". The right sidebar contains "Site Features" such as "NSF at a Glance", "News", "For the News Media", "Special Reports", "Discoveries from NSF Research", "Research Overviews", "Speeches & Lectures", "Multimedia Gallery", "NSF & Congress", "Classroom Resources", "Priority Areas", "Science and Engineering Statistics", "Search NSF Awards", "Need Help?", "Help Center", "Our New Design", and "How Do I Find...?". The bottom of the browser window shows the Windows taskbar with the "start" button and several open applications: "NSF WinStati...", "Inbox - Micro...", "RE: No cost ...", "RE: No cost ...", "Electronic Ja...", "US NSF - Nati...", "Microsoft Excel", and "Microsoft Po...". The system clock shows "1:45 PM".





Helpful Hint: Carefully Read the Program Announcements and Solicitations

- NSF has no hidden agendas. It's all there in the program announcements.
- Find the right program early!
 - It's better to do this well before you write, than after you get your reviews back.
- Talk with a program officer to make sure that your ideas fit in the program. If the program officer tells you that your ideas are too narrow or don't fit a program, look for other sources.
- Make sure that your project is worthwhile, realistic, well-planned, innovative.



Develop your brilliant idea

- **Key Questions**
 - What do you intend to do?
 - Why is the work important?
 - What does the literature provide?
 - How are you going to do the work?
- **Make sure it is innovative and exciting**
 - Survey the literature
 - Talk with others in the field
- **Can you convince people that you can do it?**
 - Obtain preliminary data
 - Develop arguments to support feasibility
 - Determine available facilities and resources
 - What you have
 - What collaborators can help with



MyNSF

<http://www.nsf.gov/mynsf/>



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Step 2: The Proposal

The Grant Proposal Guide

- Get it - Read it - Follow it
- Proposal preparation and submission
- Submission of **collaborative** proposals via
 - **Subaward**
 - **Separate, yet linked, proposals**
- Review criteria and process
- Return without review criteria
- Withdrawal, declination, and award processes
- Significant award administration procedures



Parts of a Proposal

- Cover sheet and certifications
- Project summary
 - Both intellectual merit and broader impacts described
- Table of contents
- Project description
- References cited
- Biographical sketches
- Budgets and justification
- Current and pending support
- Facilities, equipment and other resources
- Special information/documentation
 - What is allowed may vary by programs and directorates
Single Copy Documents
 - Reviewer suggestions, deviation authority, confidential information, etc.



Project Summary

- This one page is critical because it:
 - It may affect which program or panel will review your proposal.
 - It must include a statement addressing both review criteria
 - And proposals that do not separately address both criteria within the one-page Project Summary will be returned without review.
- Intellectual Merit
 - Describe the scientific/engineering problem and why it is important
 - State the overall objective of the project
 - State the specific aims
 - Describe how the aims will be achieved
- Broader Impacts
 - Educational & outreach activities; infrastructure; dissemination of results; underrepresented groups; benefit to society



Project Description

- The key to a strong proposal
- Overall concept / rationale
- Hypothesis-driven or Data-driven or Innovation-driven
- Execution
 - Careful
 - Thorough
 - Appropriate
- **Warning! Virtually all NSF formal proposals are limited to 15 pages. Note: Some preliminary proposals and other special cases may be limited to fewer pages. Check the program solicitation!**



Project Description

15 pages where you will need to cover

- Objectives and expected significance
- Relation to present state of knowledge
- Experimental methods and procedures
- Results from prior NSF support (required if applicable)
- Relation to the PI's longer term goals
- Sections optional:
 - preface, background, preliminary studies, specific objectives, significance, experimental plan



Project Description

- Know your audience - the reviewers!
- Think about the reviewers
 - Write accurately, concisely, and clearly
 - Make it easy for reviewers to like your proposal
 - You never get a second chance to make a first impression
 - First page tells it all
 - Figures and tables get your point across clearly
 - Some reviewers (particularly on inter-/multi-disciplinary proposals) may not be an expert in your specific field



Biographical Sketch

- Professional Preparation
- Appointments
- Publications
 - 5 closely related
 - 5 other significant publications
- Synergistic activities
- Collaborators & other affiliations
 - Collaborators (last 4 yrs) & co-editors (last 2yrs)
 - Graduate and Postdoctoral Advisors
 - Thesis Advisor and Postgraduate-Scholar Sponsor



Budget

- **Budgets should be**
 - reasonable, but ask for what you need
 - for personnel, equipment, travel, participant support, & other direct costs (subaward, consultant, computer services, publication costs)
 - for cost of educational activities associated with research, where appropriate
- **Unless solicitation specifies otherwise, do not:**
 - include cost-sharing on Line M in budget
 - exceed cost-sharing level or amount specified in solicitation
- **Justification**



Current and Pending Support

- List everything (that includes the proposal being submitted)
 - current, pending and anticipated
- Be careful of overlap
 - Perception of overlap could be detrimental in the review.
- Dual submissions
 - when they are allowed



Proposal Writing Tips



1. Get help with proposal writing

- Read:
 - NSF publications
 - Successful proposals
- Look before you leap:
 - Serve as a reviewer or panelist
- Talk with people:
 - Program officers
 - Current or former “rotators”
 - Successful colleagues
 - Sponsored projects office



2. Start early and don't be shy

- **Write:**
 - Rewrite and rewrite again
- **Get critiques from:**
 - Mentors and colleagues
 - Previous members of review panels



3. Be reasonable

- Be aware of the scope:
 - “Too ambitious” vs. “Too narrow”
- Be honest and up-front:
 - Address issues instead of trying to hide them
 - Acknowledge possible experimental problems and have alternatives



4. Make it easy for the reviewers

- **Know your audience:**
 - The reviewer may not be an expert in your specific field
- **Simplify and streamline:**
 - Make sure you get your overall idea across!
- **Pay attention to details:**
 - Run the spell checker and proof-read
 - Prepare clear photos, graphs, etc.
 - Make the font size as big as you can



Why do some proposals fail?

- **Absence of innovative ideas or hypothesis**
 - Will provide only an incremental advance
 - Not exciting or cutting edge
- **Errors**
 - Unclear or incomplete expression of aims
 - Faulty logic or experimental design
 - Less than rigorous presentation
- **Unrealistic, sloppy or incomplete**
- **Resources and facilities not in place**
 - PI qualifications/expertise not evident
 - Necessary collaborations not documented



If you have to resubmit...

- **Stay calm!**
 - Take ten... breaths, hours, days
 - Examine the criticisms carefully
- **Get in touch:**
 - Call, email or visit your program director
- **Think carefully about rapid resubmission:**
 - Take time to self-evaluate the proposal and the project



Funding and afterwards

■ Funding

- Budget and scope may be part of negotiations prior to making an award.
- Funding mechanisms may be as a standard (all \$s at once) or continuing (\$s released annually) grant.

■ Afterwards

- Do what you promised (*pretty much*)
- Notifications & Requests via FastLane
- Supplement opportunities
 - REU - Research Experience for Undergraduates
 - ROA - Research Opportunity Awards
 - RET - Research Experience for Teachers
- Submit annual and final reports
- Warning! Overdue annual as well as final reports will now hold up recommendations of all NSF actions (e.g., additional funding, incremental funding, PI changes, extensions, etc.)



Getting Support in Proposal Writing

- **NSF Publications**
 - **Program Solicitations**
 - **Grant Proposal Guide**
 - **Web Pages**
 - **Funded Project Abstracts**
 - **Reports, Special Publications**
- **Program Directors**
 - **Incumbent**
 - **Former "Rotators"**
- **Mentors on Campus**
- **Previous Panelists**
- **Serving As A Reviewer**
- **Sponsored Research Office**
- **Successful Proposals**





Top Ten Ways To Write a Good Proposal...

That Won't Get Funded





Inflate the budget to allow for negotiations.

Instead...

- *Make the budget reflect the work plan directly.*
- *Provide a budget explanation that ties your budget request to project personnel and activities.*
- *Make it clear who is responsible for what.*
- *Provide biographical sketches for all key personnel.*





Provide a template letter of commitment for your (genuine) supporters to use. (They will!)

Instead...

- *Ask for original letters of support that detail what your collaborators will do and why involvement in your project will help them.*
- *Letters from administrators are stronger if they demonstrate real commitment, e.g. release time, faculty development funds, new course approvals, etc.*
- *Make sure the program to which you are submitting allows letters of support or commitment and if they do, what type are allowed. Read the program solicitation!*





Assume your past accomplishments are well known - after all NSF probably funded them.

Instead...

- *Provide results from prior funding - this includes quantitative data and information on impact.*
- *Describe how new efforts build on this previous work, and how it has contributed to the broader knowledge base about educational improvement.*
- *Recognize that the review panelists are diverse and not all familiar with your institutional context.*





Assume a project website is sufficient for dissemination.

Instead...

- *A website may be necessary, but who will maintain it and how in the long run?*
- *Engage others. "Early adopters" can serve as natural dissemination channels.*
- *Plan workshops and mini-courses; identify similar projects and propose sessions at regional and national meetings.*
- *Visit high schools and other colleges and universities.*
- *Present in other public forums.*





Assert: "Evaluation will be ongoing and consist of a variety of methods."

Instead...

- *Plan for formative and summative evaluation.*
- *Include an evaluation plan with specific timelines and projected benchmarks.*
- *Engage an objective evaluator.*
- *Use an Advisory Committee or team or a small Visiting Committee.*





Assume the program guidelines have not changed; or better yet, ignore them!

Instead...

- *Read the solicitation completely and carefully.*
- *Address each area outlined in the solicitation that is relevant to your project.*
- *Check the program solicitation carefully for any additional criteria, e.g. the Integration of Research and Education, or integrating diversity into NSF Programs, Projects, and Activities*





Don't check your spelling, nor you're grammar.

Instead...

- *Check and double check; first impressions are important to reviewers.*
- *State your good ideas clearly. Ignore the bad ones.*
- *Have a trusted colleague who is not involved in the project read your drafts and final proposal.*
- *Watch word usage. For example, Don't use complimentary when you mean complementary or principle investigator when you mean principal investigator , etc.*





Substitute flowery rhetoric for good examples.

Instead...

- *Minimize negatives and describe what you will do and why.*
- *Ground your project in the context of related efforts.*
- *Provide detailed examples of impact of prior work*
- *Specify who you will work with and why.*
- *State how you plan to assess progress.*
- *Detail the tasks and timeline for completing activities.*
- *Specifically address intellectual merit and broader impacts and use the phrases explicitly in the project summary.*





Assume page limits and font size restrictions are not enforced.

Instead...

- *Consult the program solicitation and the GPG (Grant Proposal Guide) carefully.*
- *Proposals that exceed page and/or font size limits are returned without review.*





Assume deadlines are not enforced.

Instead...

- *Work early with your Sponsored Research Officer (SRO).*
- *Test drive FastLane and make sure your SRO knows how to drive too!*
- *Set your own final deadline a day or so ahead of the formal deadline to allow time to solve problems.*
- *Grants.gov is here (but for the time being so is FastLane and FastLane must be used for certain type of proposals like collaboratives)*





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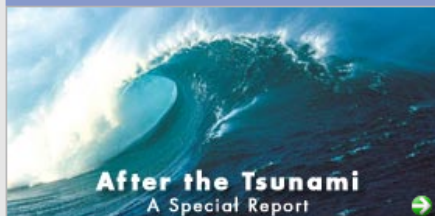
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