The Art of Proposal Writing  
SIGGRAPH 2008  
August 15, 2008, 8:30 – 10:15 am

Organizer: Barb Helfer, Leapfrog  
Speakers:  
Steve Cunningham, Brown Cunningham Associates  
Mike McGrath, Colorado School of Mines  
Larry Rosenblum, National Science Foundation

Syllabus  
Introduction: Helfer  
General concepts: McGrath  
Research: Rosenblum  
Education: Cunningham

This class covers general proposal writing for academic projects in two broad categories: research and education. It reviews the project concept, the search for an appropriate funding program, and development of a proposal based on a program announcement. Attendees develop a solid understanding of the structure of a competitive proposal, learn the different ways a proposal may be reviewed, and discuss the essential factors that determine whether or not a project gets funded.

The presenters all have a significant history with the US National Science foundation. Cunningham and McGrath are former program officers (DUE and CISE, respectively), and Rosenblum is currently a program officer with CISE whose portfolio includes computer graphics research funding. The course will thus unavoidably have a slant towards NSF programs, but will include general concepts and other funding agencies as well.

These notes were frozen well before the conference and some of the presenters’ slides were not ready at that time. It is likely that there will be additions and expansions before the actual conference presentation. An updated copy of these notes will be available after the SIGGRAPH 08 conference at http://www.cs.csustan.edu/~rsc/S08-proposal-course.pdf
Biographies of Speakers

Steve Cunningham: Steve Cunningham is a former professor of computer science at CSU Stanislaus, Noyce Visiting Professor at Grinnell College, and National Science Foundation Program Officer. Steve served ACM SIGGRAPH as Chair of the Education Committee, Director for Publications, and President, and served Eurographics as chair of the Education Board. Steve was Gemperle Distinguished Professor at Stanislaus, is a Eurographics Fellow, and received the SIGGRAPH Distinguished Service Award. Steve is the author of the textbook *Computer Graphics: Programming in OpenGL for Visual Communication* and co-author with Mike Bailey of the forthcoming text *Computer Graphics Shaders: Theory and Practice*.

Michael McGrath: Mike McGrath was a professor of engineering at the Colorado School of Mines from 1985 to 2007. He was a Program Director, National Science Foundation from 1992-1994 for the Graphics Center and National Supercomputing Centers programs. He has been involved in teaching and consulting in computer graphics since 1975. He has over 50 publications and presentations on education or research in computer graphics, CAD, scientific visualization and design. He is a member of the NSF Panel on Visualization in Scientific Computing. Mike served on the ACM SIGGRAPH Executive Committee as ACM SIGGRAPH Director for Education from 1998-2003.

Lawrence J. Rosenblum: Lawrence J. Rosenblum is Program Director for Graphics and Visualization in the Computer and Information Science and Engineering Directorate at the National Science Foundation. He has previously served as Program Officer for Graphics and Visualization at the Office of Naval Research. His research group at the Naval Research Laboratory produced advances in mobile augmented reality (AR), scientific and uncertainty visualization, VR displays, applications of VR/AR systems, and understanding human performance in graphics systems. Rosenblum has published over 80 scientific articles and served on the editorial boards of several journals. He is a Director and former Chairman of the IEEE Visualization and Graphics Technical Committee.
Granting Opportunities

From 2006 to 2007 the overall amount of grant dollars rose over ten percent from $39B to $42.9B, with six of the top fields posting double digit gains despite a tenuous economic outlook. Grant funding for 2008 is expected to have an upward trend with an estimated nine percent growth.

Health related issues are the top priority of private and community foundations. Contributing to the growth in the health care arena are grants given by the Bill and Melinda Gates Foundation. With the help of the Gates Foundation, Health care issues surpassed Education for the first time in terms of number of grants dollars allocated.

Independent Foundations spent the most by awarding $30.9B in grants in 2007, which was a 12.7 percent increase in giving from 2006. Corporation giving was at $4.4B, and Community giving at $4.1B.

Grant Facts:

• During 2006 140, 484 grants were awarded
• Of those grants awarded, they were awarded to 56,015 unique organizations
• Largest share of funding went to educational institutions
• The largest share of Independent foundations monies were spent for Health, International Affairs, Sciences, and Social Sciences.
• Corporate foundations provide the biggest share of their giving to Education and Public Affairs/Society Benefit.
• International giving increased 48.4 percent
• Foundations awarded a record 386 grants of $5M or more

Grant Facts:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Dollar Amount</th>
<th>% of Grants</th>
<th># of Grants</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts and Culture</td>
<td>$2,329,708</td>
<td>12.1</td>
<td>20,095</td>
<td>14.3</td>
</tr>
<tr>
<td>Education</td>
<td>$4,306,090</td>
<td>22.5</td>
<td>28,521</td>
<td>20.3</td>
</tr>
<tr>
<td>Environment and Animals</td>
<td>$1,145,100</td>
<td>6.0</td>
<td>8,633</td>
<td>6.1</td>
</tr>
<tr>
<td>Health</td>
<td>$4,394,462</td>
<td>23.0</td>
<td>18,260</td>
<td>13.0</td>
</tr>
<tr>
<td>Human Services</td>
<td>$2,645,895</td>
<td>13.8</td>
<td>36,047</td>
<td>25.7</td>
</tr>
<tr>
<td>International Affairs, Development, and Peace</td>
<td>$1,019,739</td>
<td>5.3</td>
<td>3,763</td>
<td>2.7</td>
</tr>
<tr>
<td>Public Affairs*</td>
<td>$2,042,490</td>
<td>10.7</td>
<td>16,807</td>
<td>12.0</td>
</tr>
<tr>
<td>Science And Technology</td>
<td>$550,591</td>
<td>2.9</td>
<td>2,422</td>
<td>1.7</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>$259,092</td>
<td>1.4</td>
<td>1,328</td>
<td>0.9</td>
</tr>
<tr>
<td>Religion</td>
<td>$412,955</td>
<td>2.2</td>
<td>4,466</td>
<td>3.2</td>
</tr>
<tr>
<td>Other</td>
<td>$16,912</td>
<td>0.1</td>
<td>122</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Note: Based on a sample of 1,263 larger foundations. Dollar figures in thousands


The Art of Proposal Writing

Barb Helfer, Leapfrog, Organizer
Steve Cunningham, Brown Cunningham Assoc
Mike McGrath, Colorado School of Mines
Larry Rosenblum, National Science Foundation

Class Description (from Advance Program)

This class covers general proposal writing for academic projects in two broad categories: research and education. It reviews the project concept, the search for an appropriate funding program, and development of a proposal based on a program announcement. Attendees develop a solid understanding of the structure of a competitive proposal, learn the different ways a proposal may be reviewed, and discuss the essential factors that determine whether or not a project gets funded.
General Class Outline

- Mike McGrath
  - Overview
- Larry Rosenblum
  - Research
- Steve Cunningham
  - Education
- Many areas of overlap

Mike McGrath

- Overview of project development
- Developing funding sources
The Goal of this Course

• To help you to get support for your computer graphics research and education work
  – Research
  – Education
    • Technical side
    • Creative side
• We primarily focus on external support
• These ideas can help you develop support within your institution and with outside agencies

Some Terminology

• Funding agency: the group or organization who makes funds available and manages proposals and awards
• Proposal: a statement of a problem and work to be done to address the problem if funding is provided
• Program officer: a person at the funding agency who works with proposers and proposals
• Review group: whoever reviews your proposal and makes recommendations on it
• SRO: sponsored research office (or officer)
Why do You Want a Grant?

• You might want a grant:
  – To build your résumé
  – To add to your status on campus
  – To get a promotion
• These are not good reasons to develop a proposal and they lead to bad proposals
• The only good reason to develop a proposal is that you have something you want to accomplish, and external funding is needed to accomplish it.

Developing Your Own Background

• Talk with successful proposers and get copies of their proposals
• Talk with program officers in your area of interest
• Go to proposal workshops within your discipline (computer science, engineering, arts, media, …), especially if you can talk with program officers there
  – For example, the SIGCSE conference always has NSF program officers from education areas
• Ask to be invited to review proposals in your area (especially with NSF)
Developing a Proposal

• You may start with only a general idea of what you want to do, and your first tasks are to be sure that the idea could work
• Is the idea important to the field?
• Is there a potential funding source for the idea?
• Is there support on campus for the idea?
  – In the department
  – From the administration

The Final Goal is to Build a Project

• A project starts with the current situation and defines a set of tasks that will create a changed situation.
• Your task is to give a clear statement of the current and goal states and how you will move from one to the other.
Are there Potential Funding Sources?

- Education has a number of options
  - On campus -- various development funds
  - In the community -- individuals or groups that are interested
  - In the region or state -- industry or foundation sources, possible state programs
  - Nationally -- national foundations or Federal programs

- Research tends to have fewer options
  - NSF, NIH, state and Federal programs, some companies, ...
  - Corporate sources

Identifying Funding Sources

- Ask your campus development or sponsored research office
- Ask professional colleagues who have been funded (you have been networking, right?)
- Do online searches
  - Library databases of foundations
  - General searches with your keywords
- BUT: always keep in touch with your campus development office because you don’t want to compromise their own development work
Look at Developing your Project in Several Stages

• Many projects can be broken into several stages
• You may be able to find different funding for each stage
  – Preparation (perhaps local startup funds)
  – Proof of concept (perhaps local support, perhaps Proof of Concept programs from larger funding sources)
  – Full development (national or large regional source)
• The success at each stage helps to prepare the project for the next stage

Key Concepts in Getting Funded

• Funding is developed, not found
• You are funded through a conversation between you and the funder
• Effective funding is a result of telling your story well
• Your story should be about an investment, not a gift
What’s in it for the Funding Agency?

• Funding agencies have specific things they want each of their programs to accomplish
• These are usually stated in their solicitations or program statements
  – Read these carefully
  – See if you can state your project in their terms
• Most projects can be described in many ways
• Most projects have many aspects

Don’t Give Up!

• Many projects are only funded after several tries
• How do you learn from a decline?
  – Talk with the declining program officer
  – Do a careful post-mortem with your development office to see how to do better next time
• There are thousands of corporations and foundations; have you found the right one?
Proposal Writing: The Good, The Bad, and The Ugly

Lawrence J. Rosenblum
Program Director
National Science Foundation
lrosenbl@nsf.gov

Outline

• US Funding Agencies
• The National Science Foundation
• The Proposal Process
• What Makes for a Good Proposal
• Examples
• The Post-Panel Process
• Other Remarks
Major U.S. Funding Organizations

- NSF
- DARPA
- ONR / ARO / AFOSR
- NIH
- DOE

NSF’s Target Audience*

- U.S. Universities and Colleges
- U.S. Nonprofit, Nonacademic Organizations
- U.S. For-Profit Organizations
- State / Local Educational Organizations
- Unaffiliated U.S. Scientists, Engineers, Educators, & Citizens
  - NSF Rarely Supports Foreign Organizations or Other Federal Agencies

* Program Solicitations may establish more restrictive eligibility
NSF Project Funding Profile

- Administration & Management: 5%
- Education & Training: 18%
- Research Projects: 52%
- Research Facilities: 19%
- Research Centers: 6%

---

NSF’s Share of Total Federal Support for Basic Research at Academic Institutions

- Computer sciences: 86%
- Mathematics: 59%
- Social sciences: 48%
- Environmental sci.: 44%
- Engineering: 42%
- Physical sciences: 35%
- Biological Sciences: 9%
- Psychology (non-med): 1%
- Medical sciences: 0%

---
Since NSF Provides so much CS Funding …

- I’ll talk about NSF proposals, but most of what you hear is applicable across the board

My NSF Review Panels

- A mix of senior & junior researchers
- Usually panel reviews but sometimes ad hoc reviews (sole or supplement)
- Typical Panel: 10-20 panelists; 8 reviews/panelist; 4 reviews/proposal
- Reviewers Rate Proposals: E, VG, G, F, P; add’l review between days 1-2
- How many reviewers will be expert in your specialty? Determined by
  - the number of proposals
  - how mainstream your topic is
Process & Outcomes

**Process:** Panel advises; PD recommends; DD concurs; NSF DGA issues the grant.

**Outcomes:**
- Recommended for award (may require budget revision)
- Declination
- Withdrawal
- Returned without Review: inappropriate for solicitation or not meeting guidelines

The First Step

- Identify a solicitation
  - Funding Opportunities Calendar at NSF
  - Guide to programs/browsing of funding opportunities at NSF web site
  - Funding search engine
  - Upcoming due dates
- Read the solicitation
- Read the proposal guidelines
  - Proposal are returned:
    - if style requirements are not met (e.g., font size)
    - if required sections are missing (e.g., broader impact in summary)
- Decide if the solicitation is appropriate
### Success Rates

- Approximate G&V success rates for FY07 (FY08 will be comparable):
  - CAREER: 25%
  - CPA Solicitation: 20%
- Success rates were about 7% a couple of years earlier
- Huge growth in the number of submitted proposals to CISE over the past decade (not true for all NSF Directorates)

### STOP: Do Not Put Pen to Paper

- What story are you telling? (a great idea is not enough!)
- What are the technical goals?
- What has been done previously?
- What is the technical approach?
- Why is it better than previous / alternative approaches?
- What is the scientific impact?
- What is the broader impact?
Before Writing: Other Thoughts

- If you are new to this, see if colleagues will let you read successful proposals
- Present ideas to colleagues
- Team with successful proposal writers
- Serve as a reviewer for conferences
- Look for opportunities to help write proposals (even while in grad school)

Intellectual Merit

- What is the fundamental science advancement?
- What new approach do you have?
- What other approaches have been/could be attempted?
- Can you make a convincing case that your approach will be superior?
- What is the scientific impact?
- Is the research either too broad, too focused, or too incremental? Budget fit?
Broader Impacts

- What are the benefits for society?
  - Scientific? Industry/Government/Society?
- Will the results be disseminated broadly to enhance scientific understanding?
  - Software available? Testbeds?
- What is the educational impact?
  - Underrepresented groups? New courses? Undergraduates? K-12 students?
- What new infrastructure for research and education is being created?
  - New instrumentation, partnerships, etc.?

Seven Deadly Sins of Proposal Writing

1. Failure to focus on the problems/payoffs
2. No persuasive structure: *poorly organized*
3. No clear differentiation: *competitive analysis*
4. Failure to offer a compelling value proposition: *potential impact*
5. Key points buried: *no highlights*
6. Difficult to read: *full of jargon, too long, too technical*
7. Credibility killers: *misspellings, grammar inconsistent format, etc.*
The following slides contain paraphrased comments from the review process

Research Innovation

- ... strong, innovative ideas in the proposed research with the PIs being the first to ...
- Success for this research would fundamentally change how modeling (of ...) is performed and seed new research areas.

OR

- Portions of the proposal were incremental and some ideas were not sufficiently developed.
- The research may be too large/ambitious.
- The work was found by the panel to be somewhat incremental.
- The research could be more ambitious, scaling with data size.
- Proposal had many parts but no integration plan.
**Prior Work**

- The ideas were novel and challenging but were also simple enough while building on previous work that they were likely to prove workable and robust.

  OR

- The PI did not adequately state the major contributions of others and did not clearly demonstrate how the proposed work would improve on earlier methods.
- The discussion of and differentiation from the prior work could have been expanded and improved.
- The PI has previous work on these methods. It was difficult to understand how much new work was being proposed.

**Approach**

- The proposal attacks a difficult scientific problem and presents methods that are innovative and may produce significant advances.

  OR

- This is a hard problem and the panel was not convinced that the results would produce a solution in real-life cases.
- The extension to a higher dimension is not trivial and more detail would have helped convince that this is doable.
- A major weakness is the lack of detail in describing the technical approach to the component parts.
- The transform methods would be expensive to compute, leading to possible limitations.
Expertise

• This is a high-risk, high-gain proposal that, given the previous achievements of the PI, was likely to produce significant successes.
• An excellent proposal with innovative ideas and a strong, complementary team of PIs.

OR

• Relevant SIGGRAPH papers were not cited, creating concern that the PI was not familiar with recent computer graphics research.
• The lead PI's role (who is active in only one problem) in serving as an integrator across problems was not presented.

Evaluation and Validation

• A well-conceived plan for user evaluation was included in the proposed work.

OR

• The team is lacking a cognitive or perceptual researcher; unclear who will provide the critical perceptual expertise.
• Late real-world validation (might suggest changes to methodology, too late in 3rd year).
### Broader Impacts – Scientific & Societal

- The strong support from these industry partners signifies large potential value of the research.
- The proposal could potentially have a big impact for both research and industry.

**OR**

- Making the software publicly available would strengthen the impact of the work.
- The panel did not find available code from the PI’s previous work.
- A testbed application was needed that could be tracked through the different parts of the proposal.
- A tie to a specific application would have helped demonstrate that their method will outperform existing techniques.

### Broader Impacts - Educational

- The panel found the education/outreach plan to be well conceived and organized.
- The educational plan is strong, providing for new courses and undergraduate and minority involvement.

**OR**

- No education plan is identified; the broader impacts are PhD student support.
- The education component was weak; few details about educational impact or plans.
- The educational plan does nothing beyond involve a graduate student in the grant.
Care in Writing

- Overall, the research plan was well organized and presented.
- The proposal is well written, effectively presenting complex material.

OR

- All reviewers found that the proposal (including the project summary) needed better organization and focus.
- Contains several misspellings.

After the Panel Review

- Most decisions made within 6 months of the closing date of the solicitation
- Declinations (by email form letter) and acceptances (by phone or email from PD)
  - Reviews and panel summaries are then available
- Read carefully for
  - whether it is worthwhile to revise and resubmit
  - what you can do better in future submissions
  - (if accepted) how to improve the research
- If clarification is needed
  - Call the PD for a constructive discussion 😊
  - Call the PD and/or DD to complain 😞
**Additional Steps**

- Serve on a panel ... you’ll understand the process better
  - Send name and areas of expertise to PD

---

**NSF CISE Career Opportunities**

- Program Directors are sought for one-year terms to four-year terms or for permanent positions in CNS, CCF, and IIS Divisions of CISE

### Some On-line Documents

- FY 2009 NSF Budget Request  
- FY 2008 NSF Budget Request  
- Grant Proposal Guide (NSF 08-01)  
- Science and Engineering Indicators  
- General Information  

---

### Hope this has helped

*Lawrence J. Rosenblum*
Program Director  
National Science Foundation  
lrosenbl@nsf.gov
Steve Cunningham

- Iowa Arts Council
- NSF Undergraduate Education Programs
- Points a proposal should address
- Making your proposal stand out
- Proposal reviewing
- Post-award issues

A Different Kind of Example: the Iowa Arts Council

- Major grants (maximum $10,000), minigrants (maximum $1500); more at http://www.iowaartscouncil.org/

- Education goals:
  - Bring schools and local civic or community organizations together to collaboratively develop educational art experiences
  - Assist educators in implementing innovative goals and strategies in the arts curriculum
  - Integrate the arts into other core subjects, such as reading, writing, history, math, science, and social studies
  - Reflect the rich cultural diversity of our state and enable learning in and through the arts of many cultures
Iowa Arts Council, cont.

• Organizational support
  – “...support eligible organizations to plan and implement a wide variety of arts-related projects and programs. The program supports artistic excellence and quality arts experiences for Iowans. Examples include but are not limited to exhibitions, performances, readings, art fairs and festivals, commissioning projects, or developing strategic plans for arts organizations.”

• Does not support
  – Art classes, general course work, college or university classes
  – Activities in which the participant receives course credit, a degree, teacher certification, etc.
  – Registration fees and expenses for individuals to attend conferences, workshops and forums

National Science Foundation: EHR/DUE

• NSF education projects generally focus on the development or implementation of ideas to improve undergraduate education in specific ways

• Two main programs in this are, though there are many others for more specialized projects

• CCLI: Course, Curriculum, and Laboratory Improvement: three kinds, $150K / $500K / $2000K

• ATE: Advanced Technological Education: many different kinds, $25K to $5000K
CCLI

- The CCLI program seeks to improve the quality of science, technology, engineering, and mathematics (STEM) education for all undergraduate students. ... efforts to create, adapt, and disseminate new learning materials and teaching strategies, develop faculty expertise, implement educational innovations, assess learning and evaluate innovations, and conduct research on STEM teaching and learning. The program supports three types of projects... ranging from small, exploratory investigations to large, comprehensive projects.

ATE

- ... emphasis on two-year colleges ... involves partnerships between academic institutions and employers to promote improvement in the education of science and engineering technicians ... supports curriculum development; professional development of college faculty and secondary school teachers; career pathways to two-year colleges from secondary schools and from two-year colleges to four-year institutions; and other activities...
NSF-Oriented Education Projects

• A project has some specific properties you can use to organize your plans. It
  – Solves a specific problem
  – Has a goal, a plan, and a rationale
  – Has institutional commitment
  – Has a careful understanding of the cost
  – Has a way to know how well it succeeds
  – Has a way to share its results with others

• These give you specific ways to organize your proposal

Let’s Walk Through These Points

• Go into some details on each
• See how each point helps you build the story you are trying to tell
The Problem

• In education, the problem is usually about teaching and learning
  – Should existing knowledge or skill be learned better?
  – Should a better teaching or learning technique be found or implemented?
  – Is there new knowledge or skills that need to be introduced?

• In summary, what needs to be changed for the benefit of the student?

The Goal(s)

• Write a broad, overarching statement of your intentions or ambitions

• Express these in terms of focused, specific, measurable objectives that lead to your goals

• These may include skill or concept development, attitude development, success rates, diversity, …
The Goal(s)

• One specific case, adapted from one of my own proposals:
  – The goal of this project is to develop a supportive set of materials that will assist a computer science instructor in creating and teaching a course in computer graphics for students who are not specialists in computer science.

The Plan

• What will you do?
• How will you do it (including timelines)?
• Who will work with you (including their commitments)?
• What resources are available, and what more will be needed?
• Relate your plan directly to your goals and objectives
Collaborations

• Collaborations are often very important, especially for wide-reaching projects
• They are evidence of others’ belief in the project and of its likely use by others
• Describe the collaborations and how they will improve the project
• Show your collaborators’ commitment with letters of support

Project Rationale

• Why should someone believe the project is good?
  – Is there a literature to support the project?
  – Is there practice that supports the project?
  – Have you done some preliminary work that shows the value of the project?
• Use support letters from key people in the field
The Institution

• What kind of institution is applying? (you usually cannot apply on your own)
• How does this project fit the nature and goals of the institution?
• Does the institution support the project? How do we know that (support letters)? Is cost-sharing needed and supported?

Measuring Success: Assessment

• How will you evaluate the success of your project as it develops? (Formative)
• How will you evaluate it when it is finished? (Summative)
  – success should match goals
  – success should be concrete and measurable
More on Assessment

• Define specific expected outcomes
  – Student learning
  – Contributions to community knowledge

• Build assessment tools around these outcomes -- it’s hard to find a good off-the-shelf assessment tool

• How will you document your observations or measurements?

Some Evaluation Resources:

• *NSF’s User Friendly Handbook for Project Evaluation*

• Other tools
  – Online Evaluation Resource Library (OERL) http://oerl.sri.com/
  – Field-Tested Learning Assessment Guide (FLAG)
    http://www.weer.wisc.edu/archive/cl1/flag/default.asp
Sharing Your Success: Dissemination

• How will you let others know of your work and how it has improved learning?

• How will you let others replicate your success?
  – publish at SIGGRAPH, of course
  – publish elsewhere in your field
  – use digital libraries in your field (e.g. NSDL)
  – Use custom Web sites, blogs, wikis, …
  – create a commercial product (e.g. textbook)

Dissemination

• The key point is to build active dissemination mechanisms, not passive ones; ordinary Web sites just aren’t exciting to reviewers

• Increasingly, the emphasis is on building a community around the idea, not simply putting the idea out. This is more work, but more rewarding
The Budget

• Present a careful breakdown of costs in the format needed by the agency, including a rationale for these costs
• Be sure that everything in your budget is within the scope of the funding program
• Look carefully for budget limits and work within them

Gotchas on Budgets

• Watch out for too-general catchall areas
  – Travel and equipment should be specific
  – Avoid “Other” categories unless something doesn’t fit, and then be specific about it
• Be aware of institutional overhead costs
• If the project will cost less than the limit, do not inflate the costs -- be honest (it shows)
• Student salaries look better to reviewers than faculty salaries
Actually Writing the Proposal

• If the agency gives you a specific outline or asks for specific information, be sure to do what is requested.

• Watch out for details that are specified in the solicitation!
  – Fonts, font size, abstract, layout, number of pages, page numbering, number of appendices, biographical information, …

Details About Proposals

• NSF proposals have a limit of 15 pages, plus a one-page project summary

• References, budget, biography, and attachments are not included in this count

• A good outline follows the order we presented: problem statement, project goals and plan, rationale, institution, assessment, dissemination, budget

• Be sure of your spelling and grammar!
  – If you are not a native English speaker, or even if you are, have your grants office copyedit the proposal
Your Proposal is a Sales Piece

• It sounds crass to say so, but the proposal’s goal is to sell your idea to the agency
  – Make your descriptions strong, positive, and pithy
  – Use short, declarative sentences
  – Emphasize how your work will benefit others

• But *never* exaggerate or spin the truth, because your readers will be experts

Make Your Proposal Stand Out

• Most programs receive many more proposals than they can fund
• Most reviewers read many more proposals than they easily remember
• Make your proposal stand out!
  – Give the project a catchy title with an acronym
  – Emphasize a unique feature of the project
  – Use diagrams, figures, and color
Make Your Ideas Easy to See

• Make sure your presentation has
  – focus
  – simplicity
so the reviewer can easily understand why your ideas merit funding

Make Sure Your Commitment Shows

• You should be *deeply* committed to this idea
  – whether or not you get the funding
  – whether or not you develop it yourself
• Your commitment should be evident in the way you describe the project and your work with it
Getting Help with Your Proposal

- It can be difficult to know whether a proposal works if you’re the only one who reads it
- Get help; have others read your drafts
  - Colleagues who know the institution
  - Friends who know the field
  - Your development office who know proposals

Getting Help

- Consider getting a peer critique
  - Fresh perspective
  - Identify points that are weak or unclear
  - Is the project believable and important?
- People are often better at evaluating others’ work than their own
How Will Your Proposal be Evaluated?

• Your proposal will be read by a program officer
• Probably it will also be read by reviewers, either singly or in a panel
• Perhaps it will be discussed with others
• All the readers can be expected to be knowledgeable, usually experts, in the area

Funding Rates

• If you can, you should find out the expected funding rate (the percentage of proposals that are funded) of the program you submit to
• A recent NSF-DUE program had 870 proposals and expected to fund 90 to 100, for a funding rate around 11%.
• The funding rates may vary widely; if you have a choice, you might want to apply to the less competitive program
The NSF Pattern

• Proposals are sent to a panel of reviewers
  – Each reviewer reads 10-12 proposals
  – Reviewers develop individual recommendations
  – Reviewers form a panel that discusses proposals
• The panel may develop a recommendation for the program officer, who then makes a recommendation to those who fund

More About Reviewers

• Reviewers make time for reviews in busy schedules and may have only 20 to 30 minutes for their first reading
• Reviewers have a wide range of reviewing experience and are knowledgeable to expert
• Reviewing is a very human process; reviewers range from skeptics to enthusiasts
Instructions to NSF Reviewers

• Just for a moment, let’s look over the shoulder of an NSF review panel as they get their instructions for an education program
• A key part of these instructions is the set of important project features that program officers want reviewers to look for
• If reviewers are looking for them, it’s your job to make sure they’re there…

Important Project Features (1)

• Quality, Relevance, and Impact:
  – Recognized need or opportunity
  – Produce one or more of: exemplary materials, processes, models, or important assessment and research findings
  – Potential for broad application
  – Advance knowledge and understanding
• Student Focus:
  – Clear relation to student learning
  – Students’ perspective
Important Project Features (2)

• Use of and Contribution to Knowledge about STEM Education
  – Clear and compelling rationale
  – Methods derived from existing knowledge
  – Effective approach for disseminating results

• Stem Education Community-Building
  – Interactions with others
  – Informal or formal, PI’s discipline or others

Important Project Features (3)

• Expected Measurable Outcomes
  – Goals translated into measurable outcomes
  – Outcomes on student learning, contributions to the knowledge base, and community building

• Project Evaluation
  – Formative and summative evaluation
  – Based on expected measurable outcomes
  – Be consistent with the limitations of the NSF program
Some Things Reviewers May Say...

- The concepts discussed here are of potential interest, but do not yet seem well developed.
- It would surprise the reviewer if this hadn't been done before, but no literature search seems to have been done.
- The project faculty seem to be active, but there is no apparent track record for their work.

Some Things Reviewers May Say...

- It was difficult to see just what the eventual outcome of this project would be.
- The project has very limited, passive dissemination and no active outreach.
- It is not at all clear how this project would support women or underrepresented groups.
Other Factors in Recommendation

• The program officer must balance the panel recommendation and the available program budget

• If your project is recommended but funds are limited, the program officer may contact you and ask if you can reduce your budget

• Try to be cooperative, honest, and clear in this conversation

If You Are Not Funded

• Remember the point from an earlier slide: 
  — Don’t give up!

• Learn what you can from reviews, from the program officer (ask for information, don’t challenge the reviewers), from colleagues, from your SRO

• Try again
Comments from Recent Reviews

• Several proposals that had been submitted before were discussed
  – Some got very good reviews because the proposers had listened to their earlier reviews
  – Some got very low reviews (again…) because the proposers did not listen to and learn from their earlier reviews
• It pays to read your reviews!

If You are Funded

• You will need to work with your institution to set up budget lines for your project
• The institution may have some requirements; be patient with them
• You will probably need to make regular progress reports and a final report, so plan for them
Good Luck!

• We wish you success with your projects and proposals!
• Questions?
• After the course, you may send questions to rsc@cs.csustan.edu
Some Funding Resources

Barb Helfer, with minor additions from Steve Cunningham

Overall Search Pattern

Google – search for “Funding Agency for University Education”
A number of individual university and government links will be shown, including listings for many countries

General Resources

ACLS
http://www.acls.org

Agency Solicitations, procurement and program announcements
http://www.ofm.wa.gov/contracts/procurement/postings.asp

Annenberg Foundation
http://www.whannenberg.org/

Appalachian Resource Center
http://www.arc.gov/index.do?nodeId=1232

Carnegie Foundation
http://www.carnegie.org/

CFDA
http://12.46.245.173/cfda/cfda.html

Charles Culpeper Foundation
http://www.culpeper.org/

Charles Dana Foundation
http://www.dana.org/grants/

Commerce Business Daily

Community of Science (funding opportunities)
http://fundingopps.cos.com/

Council of Foundations (gateway to philanthropy on Web)
http://www.cof.org/council/content.cfm?ItemNumber=586&navItemNumber=2477

DARPA

Defense Threat Reduction Agency (DTRA) Solicitations
http://www.dtra.mil/be/business_opp/procurement/acq_proccomp.cfm

Department of Defense Small Business Innovation Research
http://www.dodsbir.net/
Federal Aviation Administration
http://www.faa.gov/education_research/

Federal Business Opportunities
https://www.fbo.gov/index?s=main&mode=list&tab=list

Federal Information Exchange
http://www.info.gov/

Federal Register
http://www.gpoaccess.gov/fr/index.html

Federal Web Locator
http://lawbase.law.villanova.edu/fedweb/

FedWorld Network
http://www.fedworld.gov/

Foundation Center
http://foundationcenter.org/

Fundsnet Services

Grants.gov
http://www.grants.gov/search/searchHome.do

Grants.gov Procurement Technical Assistance Program (PTAP)
http://www07.grants.gov/search/search.do?&mode=VIEW&flag2006=false&oppId=41186

GrantsNet
http://sciencecareers.sciencemag.org/funding

Global Fund for Women
http://www.globalfundforwomen.org/cms/

Higher Education Research Hub
http://www.higher-ed.org/funding.htm

National Aeronautical and Space Administration (NASA)
http://education.nasa.gov/edprograms/fellowgrants/index.html

National Endowment for the Arts (NEA)
http://www.nea.gov/

National Endowment for the Humanities (NEH)
http://www.neh.gov/grants/

National Institutes of Health (NIH)
http://www.nih.gov/science/

National Institutes of Health Office of Extramural Research (OER)
http://grants.nih.gov/grants/oer.htm
National Science Foundation (Computer Science and Engineering)
National Science Foundation (Undergraduate Education)

National Science Foundation (Education in Science and Engineering)
http://www.nsf.gov/funding/research_edu_community.jsp

USA.gov Index of U.S. Government Departments and Agencies
http://www.usa.gov/Agencies/Federal/All_Agencies/index.shtml

USA.gov Nonprofit Gateway
http://www.usa.gov/Business/Nonprofit.shtml

Small Business Administration
http://sba.gov/

Sponsored Programs Information Network (SPIN)
http://www.infoed.org/new_spin/spin.asp

Society of Research Administrator's GrantsWeb
http://web.fie.com/cws/sra/resource.htm#us

The University of Iowa Division of Sponsored Programs
http://research.uiowa.edu/dsp/main/?get=internat_funding_sources

USAID - Education & Universities
http://www.usaid.gov/university/

US Department of Commerce
http://www.commerce.gov/Grants/index.htm

US Department of Defense:

Defense Technical Information Center (DTIC)
http://www.dtic.mil/dtic/

Office of Naval Research (ONR)
http://www.onr.navy.mil/

US Army Research Institute (ARI)
http://www.hqda.army.mil/ari/

US Department of Education
http://www.ed.gov/about/offices/list/ocfo/grants/grants.html

US Department of Energy
http://www.science.doe.gov/grants/
Electronic Help Tools

American Library Association (ALA)

Circle of Philanthropy
http://philanthropy.com/

FEDIX Alert
http://k12s.phast.umass.edu/stem/fedix.html

FedBizOpps (FBO Daily)
http://www.fbodaily.com/

Electronic Reports

Foundation Center - Foundation Growth and Giving Estimates
http://foundationcenter.org/gainknowledge/research/pdf/fgge08.pdf

Foundation Center - Highlights of Foundation Giving Trends
http://foundationcenter.org/gainknowledge/research/pdf/fgt08highlights.pdf
Some comments (with minor changes) I have written on reviews
Steve Cunningham

The comments below come from my personal reviews on projects since I left NSF, covering intellectual merit and broader impacts, with a few changes to remove specific project or other references and to trim down longer comments. These are included to show some of the kinds of things that a reviewer may pull out of a proposal so that you can try to avoid them.

**Intellectual Merit**
The concepts discussed here are of potential interest, but do not yet seem well developed for computer science. These need to be better developed before they can be considered to be "well grounded in research and practice" and used as a basis for curricula. The project has a number of buzzwords strung together, but they do not seem to be well connected.

It would surprise the reviewer if this [project work] hadn't been done someplace before, but there is no indication that this project has looked for that. Indeed, "literature search" is yet to be done. Although literature is cited in the proposal body, there is no bibliography with the proposal.

The project plan is very open and is based on the assumption that XXX, but it would have been very helpful if any example of such an approach had been cited.

The project faculty are active, but there is no apparent track record for their work with the kind of transformative ideas that would be needed by a project such as this.

The reviewer does not share the optimistic outlook of the proposers. ... The question is whether there is enough push in the process to let it succeed. There are many steps involving many individuals and groups, but the narrative does not give any timelines. It's difficult to see how this much process could give any vibrant, strong products. How could they expect to do all this in two years?

There are many good ideas in this project, and the reviewer is sure that it will serve the institution well. However, the reviewer questions whether this work is appropriate as a XXX project.

Part of the difficulty the reviewer had with this project comes from the fact that it was difficult to see just what the eventual outcome of this project would be. There are some general statements about results, but little that was specific. The evaluation plan does not contain measurable goals or have methods to collect evidence about the project.
**Broader Impact**

The project feels weak in broader impact. It has very limited, passive dissemination and no active outreach. Its impacts are local and it's difficult to see how it would have an interest for anyone else.

The project seems to be entirely local, with the project team coming from the departmental curriculum committee and the only outside input coming from the departmental advisory board. There is no history of working on transformational projects and the cited literature is quite thin. The reviewer was surprised to see no XXX publications or activities mentioned.

In general, this project seems to be entirely focused on the local environment. The dissemination plan is completely passive, which is surprising given the presence of the external board, and there is no mention of plans to extend any results to other institutions.

Dissemination looks vague, based on a range of unspecified journal publications. There are no workshops or other active processes planned to help other institutions develop similar programs.

Student diversity seems to be expected because of being an urban campus and because the faculty are diverse, but no figures are given about the diversity of the students.

It is not at all clear how this project would attract more women or underrepresented groups into computing degrees.