NSF PROPOSAL PREPARATION

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BRIEF INTRO

- Professor of Computer Science, Wayne State (2002 - Present)
- NSF Program Director (CNS Core, 2013-2015)
- NSF panelists at least once a year in the last decade
- Research areas:
  - Edge Computing
  - Computing systems for autonomous driving
  - Smart and connected health

NSF PROPOSAL REVIEW PROCESS

https://www.nsf.gov/bfa/dias/policy/merit_review/illustration.pdf

PREPARATION

- Read the solicitation CAREFULLY
  - PDs spend a lot of time revising the solicitation
  - Culture at different agencies is very different (NIH vs. NSF, NSF vs. DOT/DOE)
- Problem-driven team forming
  - Many solicitations has a limit for PI these days
  - Learn to say "**No**" for certain proposal activities
- Start as early as possible
  - Your deadline = $deadline – 5 business days

PROPOSAL VS. PAPER

- A proposal is selling a problem
- A paper usually is selling a solution

- A reviewer tends to like a proposal if he/she is convinced to work on the problem him/herself

LEVERAGE NSF INVESTMENT

- Networking
  - Platforms for Advanced Wireless Research, https://advancedwireless.org/,
  - FABRIC, https://fabric-testbed.net/
- Cloud
  - Chameleon, https://www.chameleoncloud.org/
  - CloudLab, https://cloudlab.us/

CLOUD COMPUTING RESOURCES

- CloudBank (https://www.cloudbank.org/)
  - Amazon Web Services (AWS), Google Cloud Platform (GCP), IBM Cloud, and Microsoft Azure
- Proposers should describe this request in a Supplementary Document including: (a) which public cloud providers will be used; (b) anticipated annual and total costs for accessing the desired cloud computing resources, based on pricing currently available from the public cloud computing providers; and (c) a technical description of, and justification for, the requested cloud computing resources. The proposal budget should not include the costs for accessing public cloud computing resources via CloudBank.

CISE-MSI SPECIFIC CATEGORIES

- Thread 1: Research Capacity-Building Planning (RCBP): $300K/2yrs
  - Track 1A. Enhancement and Development (RCBP-ED)
    - Enhance and develop infrastructure elements to support research
  - Track 1B. Research-Focused Projects (RCBP-RF)
    - help MSIs build research capacity by developing interdisciplinary and/or innovative partnerships around CISE research programs
- Thread 2: Demonstration Projects (DP) : $500K/3yrs
  - promote long-term relationships via collaborative effort on a real project
- Thread 3: Research Partnerships Enhancement Projects (RPEP)
  - The proposing team should have demonstrated prior success via collaborative projects and should describe how the requested funds will result in large-scale, transformative impact via the proposed partnership.

MERIT REVIEW FOR BOTH IM/BI

- 1. What is the potential for the proposed activity to:
  - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
  - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
- 2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
- 3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
- 4. How well qualified is the individual, team, or organization to conduct the proposed activities?
- 5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

PROPOSAL STRUCTURE

- Vision/Motivation – 1.5-2 pages
- Previous work – 0.5-1 page
- Research Plan – 10-12 pages
- Evaluation Plan – 1 page
- Broader Impacts – 1-1.5 pages
- Intellectual Merit – 0.5 page
- Prior NSF support – 0.5 page
- Program-specific requirements
  - Risk analysis, collaboration plan

VISION AND MOTIVATION (2 PAGES)

- Big picture
- Background and motivation
- Proposed work
  - High level overview of your research plans
- PI qualifications

PREVIOUS WORK (0.5-1 PAGE)

- Categorize previous work into several categories

RESEARCH PLAN (10-12 PAGES)

- Overview
  - Introduce thrusts/components, overarching architecture, relationship
- Each thrust
  - Background: State-of-the-art and problems
  - Research tasks X.1, X.2, X.3
  - Preliminary results
  - Expected outcomes

- Note: if you have collaborator/support, please link them in the narrative.
- Warning: need to distinguished existing work with proposed work

EVALUATION PLAN (1 PAGE)

- How to assess the success of the proposed research activities?
- Platform development
- Open sources?
- Simulation
- Where are data come from?

BROADER IMPACTS

- Projects in this thread should indicate how undergraduate and/or graduate students from the MSIs will be involved in the research efforts.
- Education Plan
  - Curriculum development
  - Undergraduate research
  - K-12
  - Outreach plan (e.g., venues to publish, tutorials)
  - Diversity and inclusive
  - Assessment
- Impact to society
- Impact on research and industry

PROGRAM SPECIFIC REQUIREMENTS

- How the proposed work will provide new and/or ongoing research opportunities for undergraduate and/or graduate students enrolled at MSIs, or those students involved in research spanning partnerships between one or more MSIs and other research-intensive organizations. *Standalone (or single-PI) research projects do not qualify.*
- How undergraduate and/or graduate students from the MSIs will be involved in the research efforts.
- Additionally, the project must include undergraduate and/or graduate students in the research activities and should foster student involvement (attendance, presentation, etc.) at a technical conference(s).

INTELLECTUAL MERIT (0.5PAGE)

- This is very related to write up in Vision/Motivation, as well as summary
- The project intends to design …..
- The key strategy is to …..
- It includes the following directions. (1)… (2) …. (3)….
- The proposed research will provide …..(expected outcomes)

PRIOR NSF SUPPORT

- Don’t list all of them
- Most relevant
  - Basic information, title, proposal ID, period, $$, PI/Co-PI role
  - Intellectual Merit (e.g., papers published in this grant)
  - Broader Impacts (e.g., students involvement, recruitment)

OF PROPOSALS/YEAR?

- PI role: 2-3
  - Industry Research Awards
- Co-PI role: 2-3
  - Getting good experience
  - Exploring new areas

SHOULD I COMPETE WITH MY ADVISOR?

- Never
- First 2 years: Golden time to define your career
  - No financial worries
  - Less teaching load
  - Environment is nice
- CRII mechanism (2014 -)

SCOPE OF THE PROPOSAL

- Many tasks are not good
- Small grants prefer focused scope
- Distinction between preliminary work and proposed work
  - Red flag: your proposed work has already been published

SOME EXTRA TIPS

- Try to meet PDs at conferences
- Volunteer to serve on panels (don’t be shy)
- Think out of box new problems
- Don’t collaborate with your advisor (before tenure)
- Check active awards in your area
- Finding a couple of good students

FINAL WORD

- Never give up and keep publishing on top-tier venues in your field