Faculty Early Career Development Program (CAREER)
and
EArly-concept Grants for Exploratory Research (EAGER)

National Science Foundation

Monday April 27, 2020

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Outline of workshop

General overview of CAREER and EAGER proposals (Lique Coolen)

Review process (Lique Coolen)

Tips and experiences by CAREER awardee: Dr. Bjorn Lussem (Physics)

Tips and experiences by EAGER awardee: Dr. Gokarna Sharma (Computer Science)

Program outline and college support (Lique Coolen)

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General Overview

Presented by Lique M. Coolen, Ph.D.

Associate Dean, College of Arts and Sciences

Monday April 27, 2020

https://www.kent.edu/cas/research

CAREER (NSF 20-525)

- **Main objective:**
  - To launch the life-long career as a research scholar-teacher of a tenure-track assistant professor

- **Contains a Research Plan and an Education Plan**

- **Key to success:**
  - Research and Education plans need to be <u>tightly integrated</u>

PHASE I

PROPOSAL PREPARATION AND SUBMISSION 90 DAYS

1 OPPORTUNITY ANNOUNCED	2 PROPOSAL SUBMITTED	3 PROPOSAL RECEIVED

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214   https://www.nsf.gov/pubs/2020/nsf20525/nsf20525.htm

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EAGER

Main objective: to support exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches.

This work may be considered especially "high risk-high payoff" in the sense that it, for example, involves radically different approaches, applies new expertise, or engages novel disciplinary or interdisciplinary perspectives.
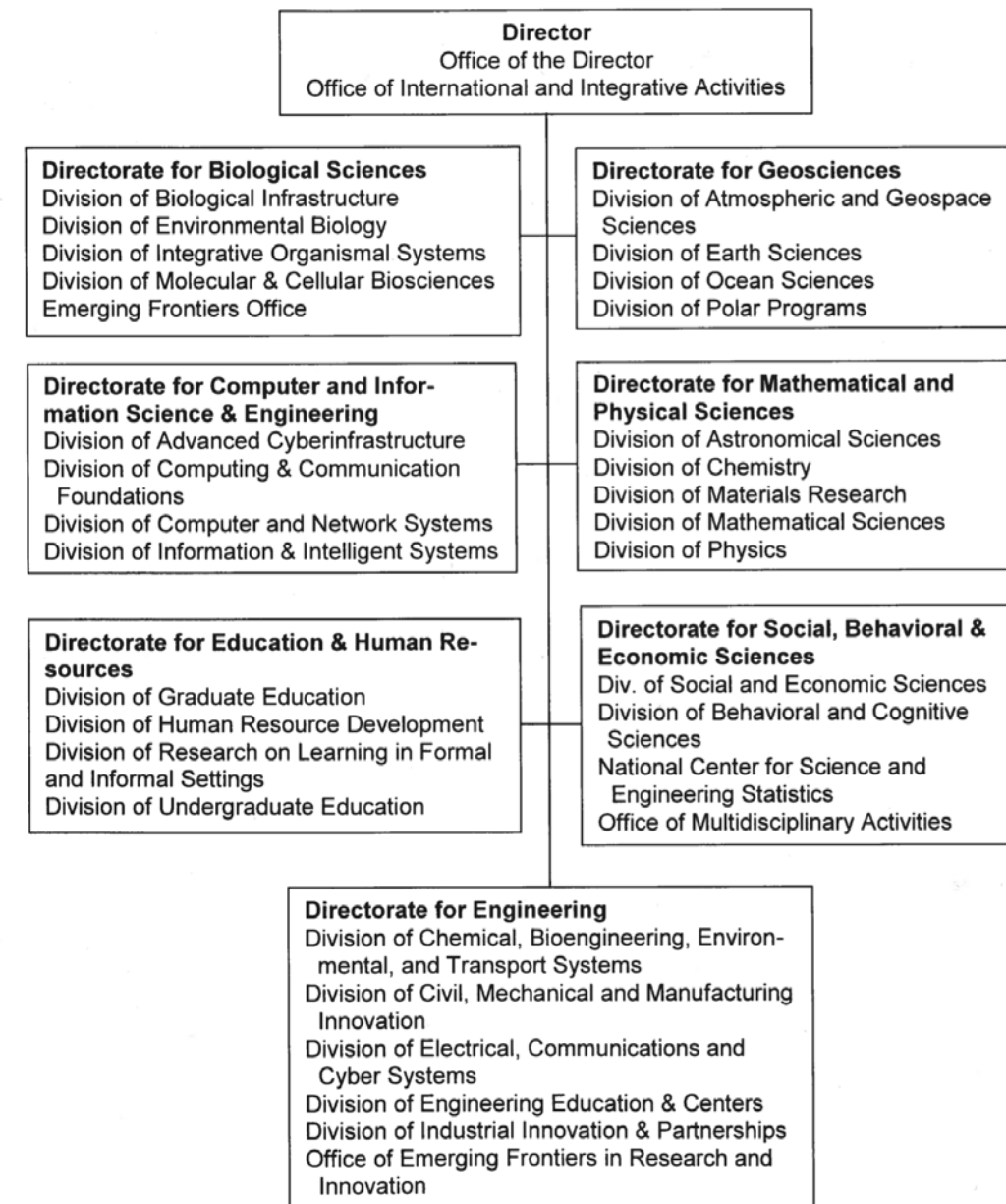
https://www.nsf.gov/about/transformative_research/submit.jsp

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Select Directorate and Division

- **Maximize Programmatic relevance**

- **Contact the Program Officer**
  - First contact by email
    - Use phrase "maximize programmatic relevance"
  - Send them Project Summary (1 Page)
    - Overview
    - Intellectual Merit
    - Broader Impacts

"Proposers are encouraged to communicate with the CAREER contact or cognizant Program Officer in the Division closest to their area of research to discuss the expectations and approaches that are most appropriate for that area (see https://www.nsf.gov/crssprgm/career/contacts.jsp for a list of CAREER contacts by division)."

"PI(s) must contact the NSF Program Officer(s) whose expertise is most germane to the proposal topic prior to submission of an EAGER proposal. This will aid in determining the appropriateness of the work for consideration under the EAGER proposal type; this suitability must be assessed early in the process."

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Director
Office of the Director
Office of International and Integrative Activities

Directorate for Biological Sciences
Division of Biological Infrastructure
Division of Environmental Biology
Division of Integrative Organismal Systems
Division of Molecular & Cellular Biosciences
Emerging Frontiers Office

Directorate for Geosciences
Division of Atmospheric and Geospace Sciences
Division of Earth Sciences
Division of Ocean Sciences
Division of Polar Programs

Directorate for Computer and Information Science & Engineering
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Division of Behavioral and Cognitive Sciences
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Office of Multidisciplinary Activities

Directorate for Engineering
Division of Chemical, Bioengineering, Environmental, and Transport Systems
Division of Civil, Mechanical and Manufacturing Innovation
Division of Electrical, Communications and Cyber Systems
Division of Engineering Education & Centers
Division of Industrial Innovation & Partnerships
Office of Emerging Frontiers in Research and Innovation

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Project Description

CAREER: 15 pages
EAGER: not more than 8 pages

1. **Overview and Objectives** (also sometimes called aims or specific aims)
   - Scientific objectives
   - Educational objective(s)
   - Intellectual merit

2. **Background**
   - Review of literature
   - Preliminary studies

3. **Research Plan**
   - For each objective:
     - Introduction
     - Research design
     - Expected (and unexpected) outcomes
     - Potential problems and alternative approaches
   - Timetable

4. **Educational Activities**
   - Assessments
   - Timetable
   - <u>Integration of research and educational activities</u>

5. **Broader Impacts**

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CAREER: Project Description (15 Pages)

- The Project Description section should contain a well-argued and specific proposal for activities that will, over a 5-year period, build **a firm foundation for a lifetime of contributions to research and education** in the context of the Principal Investigator's organization.

- The proposed project should aim to advance the employee's career goals and job responsibilities as well as the mission of the department or organization.

  - Description of proposed research project and expected significance of results
  - Description of proposed educational activities and their intended impact
  - Description of how research and educational activities are **integrated or synergistic**
  - Description of other broader impacts, besides the education activities, that will accrue from the project
  - Results of prior NSF support if any

https://www.nsf.gov/pubs/2020/nsf20525/nsf20525.htm

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Integration of Research and Education

- All CAREER proposals should describe an <u>integrated path</u> that will lead to a successful career as an <u>outstanding researcher and educator</u>.

- NSF recognizes that there is no single approach to an integrated research and education plan, but encourages all applicants to <u>think creatively about the reciprocal relationship between the proposed research and education activities</u> and how they may inform each other in their career development as both outstanding researchers and educators.

- These plans should reflect the proposer's own disciplinary and educational interests and goals, as well as the needs and context of his or her organization.

- In addition, NSF recognizes that some investigators, given their individual disciplinary and career interests, may wish to pursue an additional activity such as entrepreneurship, industry partnerships, or policy that enhances their research and education plans.

https://www.nsf.gov/pubs/2020/nsf20525/nsf20525.htm

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Broader Impacts

- **Broader impact of research**

- **Broader impact of education**

- **Outreach**

  May include:
  - K-12 students (schools, museums, zoos, etc)
  - Underrepresented minority populations
  - Social media

- **Assessments**

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Additional Pages

- **References**
- **Biographical Sketch of PI (no co-PIs allowed)**
- **Proposal Budget**
- **Budget Justification**
- **Current and Pending Support**
- **Facilities, Equipment, and Other Resources**
- **Data management Plan**
- **<u>Departmental Letter</u> (from Chair)**
- **Letters of Collaboration (standard form)**
- **Post-doc Mentoring Plan**
  - Office of Postdoctoral Studies
- Collaborators & Other Affiliations (COA)

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Merit Review

PHASE I
PROPOSAL PREPARATION AND SUBMISSION 90 DAYS

1 OPPORTUNITY ANNOUNCED
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PHASE II
PROPOSAL REVIEW AND PROCESSING 6 MONTHS

4 REVIEWERS SELECTED
5 PEER REVIEW
6 PROGRAM OFFICER RECOMMENDATION
7 DIVISION DIRECTOR REVIEW

- **Program Officers select potential reviewers**
- **Reviewers indicate conflicts (COI) with proposals**
- **Reviewers identify level of expertise for all proposals**
- **Each proposal has three reviewers (primary, secondary, tertiary)**
  - And sometimes has Ad Hoc reviews as well (not in the "room")
- **Reviewers submit written reviews**

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Panel Review Meeting

Panel Meeting at NSF Headquarters

- All proposals are discussed: approx. 12 minutes per proposal

- **Primary reviewer:**
  - summarizes briefly, gives her/his review of the proposal, including the strengths and the weaknesses in both intellectual merit and broader impacts, results from prior funding (if applicable), response to previous reviews (if applicable), data sharing and management, and any other comments

- **Secondary reviewer:**
  - will provide her/his evaluation of the proposal, bringing up any important points not mentioned by the primary reviewer, and summarize the key points made by the AdHoc reviewers

- **Tertiary reviewer is the Scribe.**
  - The tertiary reviewer's primary job is to take notes during the discussion, although s/he may add her/his thoughts of the proposal to the general discussion.
  - After the discussion, the Scribe will draft the panel summary for the proposal using the template provided at panel. The panel summary is a brief description of the discussion leading to the panel's ranking that will be sent verbatim to the PI, together with the written reviews.

Merit Review

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CAREER: Written Reviews: Instructions to reviewers

- **Two criteria:**
  - The reviews must address (1) the intellectual merit, and (2) the broader impacts of the proposal.

- **Intellectual merit** encompasses the proposal's potential to advance knowledge. Focus your evaluation of the intellectual merit on the:
  - questions driving the research,
  - feasibility of the research plan,
  - impact of the research on the field.

- **Broader Impacts** encompass the proposal's potential benefit to society and contribution to the achievement of desired societal outcomes. Focus your evaluation of the broader impacts on the:
  - **broadening of participation** in science and/or science outreach,
  - **integration** of research and education,
  - dissemination of novel insights to **a wider audience**,
  - **impact** on science or society.

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CAREER: 5 Review Elements: Instructions to reviewers

The following elements should be considered in the review for both criteria (intellectual merit and broader impacts:

1. What is the potential for the proposed activity to

    - Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    - 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?

Merit Review

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CAREER: Rating: Instructions to reviewers

- When you submit your review, you will be asked to provide an individual rating of Excellent, Very Good, Good, Fair, or Poor:

- Excellent – Outstanding proposal in all respects; essentially no weaknesses; deserves highest priority in recommendation for award

- Very Good – High-quality proposal in nearly all respects; should be recommended for award if at all possible

- Good – Quality, meritorious proposal, worthy of consideration for award

- Fair – Proposal lacks one or more critical aspects; key issues need to be addressed

- Poor – Proposal has serious deficiencies

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Role of Program Officer

PHASE II

PROPOSAL REVIEW AND PROCESSING 6 MONTHS
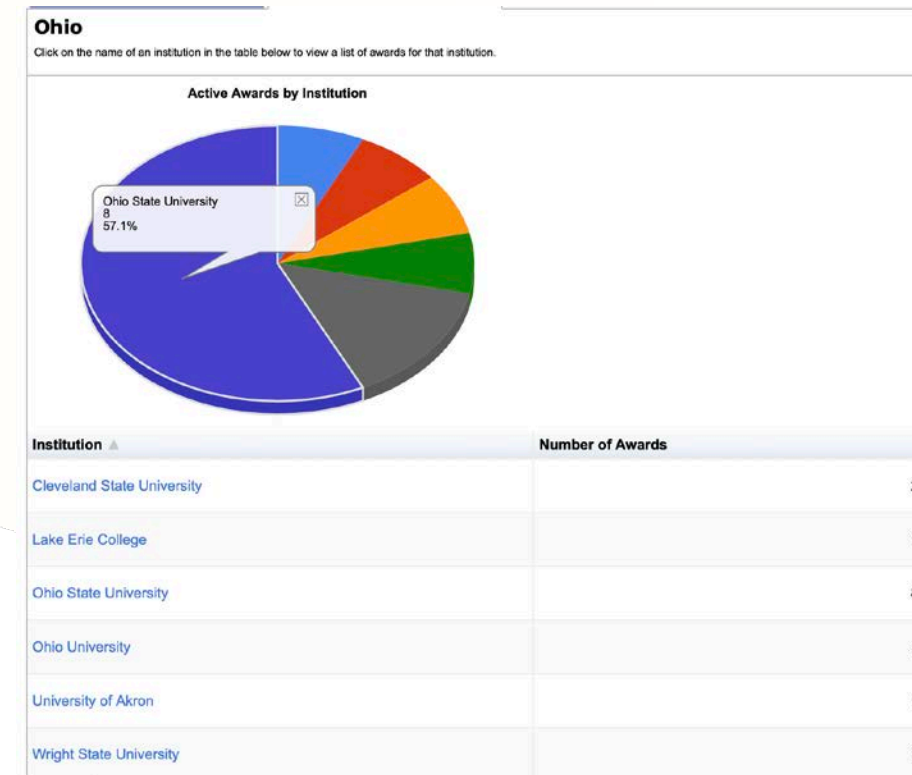
| 4 REVIEWERS SELECTED | 5 PEER REVIEW | 6 PROGRAM OFFICER RECOMMENDATION | 7 DIVISION DIRECTOR REVIEW |

- During scientific review panel meetings, proposals are placed in high, medium, low categories.

- After scientific, technical and <u>programmatic review and consideration of appropriate factors</u>, *the NSF Program Officer* recommends to the cognizant Division Director whether the proposal should be declined or recommended for award.

Ohio
Click on the name of an institution in the table below to view a list of awards for that institution.

Active Awards by Institution

Ohio State University
8
57.1%

Institution ▲	Number of Awards
Cleveland State University	2
Lake Erie College	1
Ohio State University	8
Ohio University	1
University of Akron	1
Wright State University	1

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Outline of workshop

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The CAREER Award
a very subjective Story

B. Lüssem

[1]Department of Physics, Kent State University

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CAREER

„The intent…is to provide stable support at a sufficient level and duration to enable awardees to develop careers as outstanding researchers and educators"

- What do you want to accomplish in your career as a scholar (teaching and research)?
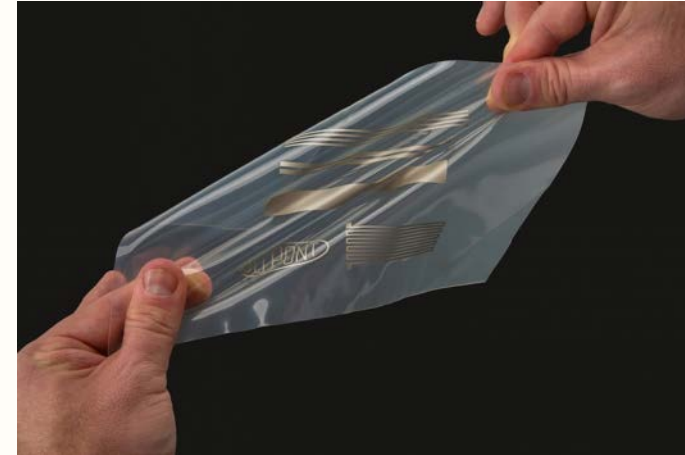- How can you use 5 years of funding to set you on a trajectory to reach this aim?

Research Award

- Limited to a focused research question
- 3 years
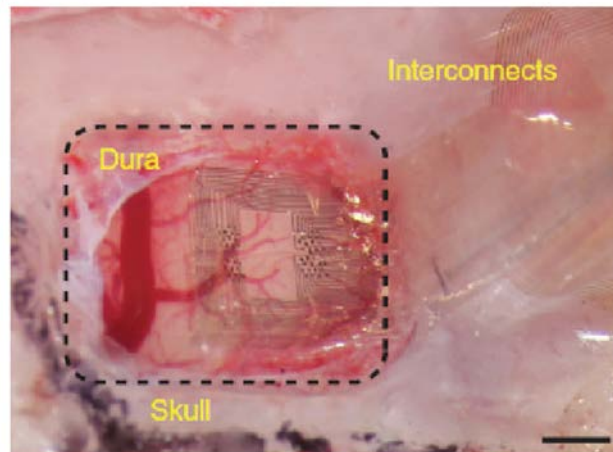- Educational Component not as important

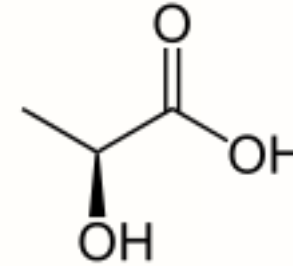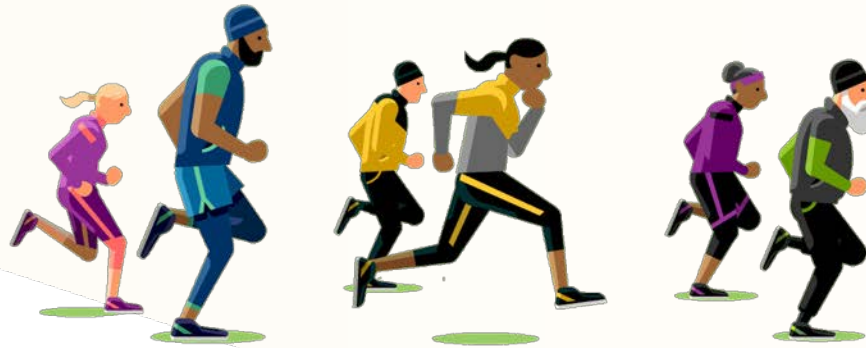[1] Kaltenbrunner et al., Nature **499**, 458 (2013)
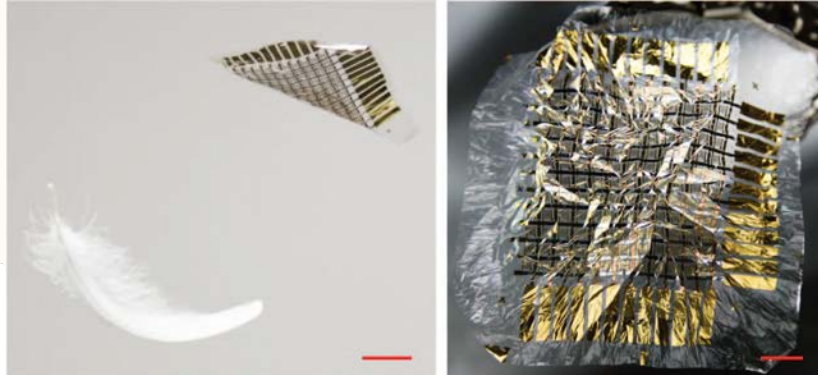
[2] Fang et al., Journal of Materials Chemistry C 3, 6426 (**2015**)

[3] Khodagholy et al., Nature Communications **4,** 1575 (2013)

- **Organic Electronics is**
  - Flexible and lightweight [1]
  - Strechable [2]
  - Bio-compatible [3]
  - Bio-degradable [4]

[4] Lei et al., PNAS **114,** 5107 (2017)

Lactic Acid is formed during intense exercise, i.e. under anaerobic conditions

- Precise control of training conditions needed

- Indirect parameter: pulse

- Direct and instantaneous measurement of lactic acid levels in sweat would be highly beneficial

First Try: summer 2016

- Ratings all over the place: G, E, G, VG, E
- Panel recommendation: "recommend" (not "highly recommended")
- Weakness stated – technical details that I did not agree with

Emailed Program Manager to get more information

- She proposed to fund "EAGER" project instead to get started (18 months)
- Obviously, I didn't make my objectives clear enough – It's the job of the PI to clearly state what he wants to do and why. Don't rely on the reviewer to find out what you want to do on his own.

Next Try: summer 2017

- Changed topic slightly (I had to because EAGER project was still running)
- Talked to Program Manager ahead of time to make sure she's ok with another proposal from me
- Finally got into "highly recommend" category

What did I do differently?

- Slightly different topic – maybe more mainstream?

- Clearly identified problem in existing literature

- Tried to make it straightforward for review to understand what the proposal is all about and why it is new/important:

  - Formulate clear objectives/aims

  - Tried to formulate research hypothesis for every experiment

  - Keep it short

- Research is not always logical – it makes all different turns and there are lot of mistakes/personal struggles
- We don't teach that in science classes
- How can we integrate the "nature of science" in University Physics 2 class?

- Develop graphical short stories illustration the nature of science
- Students involved in short projects

- Keep it simple for the reviewer

- Get letters of support

- Make clear that you have the necessaries resources/capabilities to do the project

- Be realistic! Don't overpromise

- Don't try to squeeze as much info into 15 pages as possible...

- Get to know the people in your field – they might become your reviewer

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Communication with the PO

Decision to go after EAGER

EAGER reviews/process

Reviewer identified strengths of my proposal

Experience/Tips

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EAGER

Main objective: to support exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches.
This work may be considered especially "high risk-high payoff" in the sense that it, for example, involves radically different approaches, applies new expertise, or engages novel disciplinary or interdisciplinary perspectives.

https://www.nsf.gov/about/transformative_research/submit.jsp

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EAGER Grant: 1936450

- **Division: CCF (Computing and Communication Foundations)**
- **Program: AF (Algorithmic Foundations)**
- **Amount: $199,977**
- **Duration: 2 years (10/01/2019-09/31/2021)**
- **Support (per year):**
  - 1 full GA
  - 2 G/UGs (hourly)
  - Domestic/foreign travel (~5 travels)
  - 1-month summer for the PI

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Communication with the PO

- **Served on the AF small CORE proposal panels 2016-2018**

- **Got to know all 3 POs of the AF program**

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Communication with the PO/decision to go after EAGER

- **Submitted CRII (2016) and CAREER (2018) proposals within AF**

- **5 CRII proposal reviews: VG, G, F, VG/G, VG/G**

- **6 CAREER proposal reviews: VG, VG/G, G, G, G, G/F**

- **Same AF PO handled both CRII and CAREER proposals**

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Communication with the PO/decision to go after EAGER

- **Talked to the PO about the CAREER proposal reviews**

- **Discussion on no separate panel for distributed algorithms – disparity on reviews**

- **Combined panel: (sequential) algorithms + distributed algorithms**

- **The PO suggested whether I would like to go after the EAGER funding mechanism**

- **Asked the PO about the support amount, impact in future submissions, the review process**
  - I thought the EAGER support is typically $50-70k.

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Decision to go after EAGER/Reviews

- **Support: the PO said maximum through EAGER is $300k. Decided on ~$200k looking at the KSU CAREER budget for 1 GA, 2 UGs, travel support, and PI support.**

- **Review process: No separate review; the PO said he will consider CRII and CAREER reviews**

- **Impact on future submissions: No impact**

- **Submission to decision: 1 month**

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Proposal Strengths (three EAGER components)

- **New algorithmic ideas, potentially applicable beyond the topics of the proposal, if they work, and some risky components (high risk high payoff)**

- **Further experimental results on risky components (why EAGER)**

- **Combination of the above two aspects (Why EAGER will lead to successful project proposal later)**

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Tips

- **(Try to) serve on the panels of the programs of your interest**
  - AF conducts an online availability survey of AF researchers to pick panelists

- **Know POs of your programs and stay connected**

- **Reach out to them after (declined) proposal notifications**

- **Talk to POs about different funding mechanisms, other matters**
  - POs know a lot and can provide useful advice

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Grant Writing Support: College of Arts and Sciences

https://www.kent.edu/cas/research

Grant Opportunity Information

      Workshops and information sessions with internal and external speakers

      Alerts for funding opportunities via website, emails, and in-person meetings

Writing Support

      Peer-support writing groups

      Writing Time Schedule

      Bi-Weekly sessions to discuss content of specific "pages"

      Proofreading and compliance checking of all pages

Constructive Feedback

      Internal faculty mentor(s)

      Review previous comments

      External reviewer feedback

Tailored to your needs

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