Successful Grant Seeking Series

Demystifying the NIH and NSF Agency Structure and Review Process

September 16, 2021

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The Office of Research Development provides an array of resources for researchers trying to navigate the daunting grants landscape.

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ORD resources for prospective PIs

- Limited submissions and R-initiative guidance
- Proposal development and editing
- Mentoring: NSF CAREER Academy, NIH Accelerator
- Assistance with finding external evaluators and reviewers
- Assistance with forming and managing teams
- Access to *Research Development & Grant Writing News* and *New Faculty Guide to Competing for Research Funding*
- Proposal repository (in development)
- Training in aspects of grant seeking

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Upcoming ORD training events

- Crafting an Overview Page (October 6, 2021, 10 AM to 12 PM)
- Overview of the NSF CAREER Program and the Clemson CAREER Academy (October 18, 3:30 to 5 PM)
- Forming Healthy Research Teams (November 4, 2021, 3 to 5 PM)
- Writing to the Reviewer (December 1, 2021, 10 AM to 12 PM)

Register:
https://www.clemson.edu/research/development/events.html

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Today's presenters

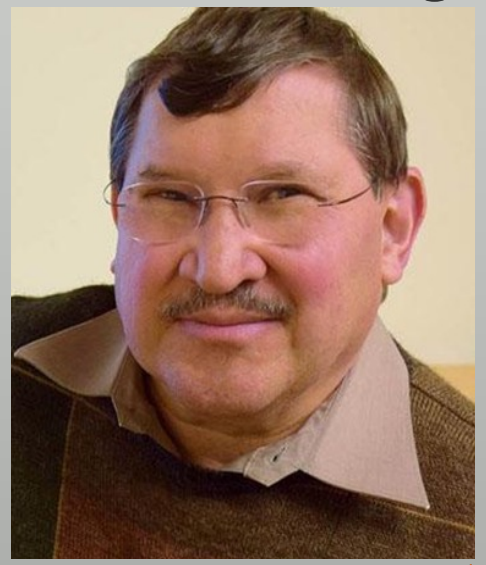
Chris Paredis

BMW Endowed Chair in Automotive Systems Engineering and former NSF Program Director



Robert Anholt

Provost's Distinguished Professor of Genetics and Biochemistry and Director of Faculty Excellence, College of Science



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Follow-up

- Feedback survey: what would you like to explore further?
- ORD office hours (Zoom)
- Send questions to jacobij@clemson.edu

Navigating the NIH



Robert Anholt, PhD, Provost's Distinguished
Professor of Genetics and Biochemistry

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Navigating the NIH

Structure of the NIH extramural program

The review process, including study section procedures

How to prepare your application for optimal outcomes

How to respond to negative outcomes

Questions and discussion

www.nih.gov

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Applicant



Submit grant application through grants.gov

Center for Scientific Review



Grant is assigned to study section

Study Section

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Significance

Investigators

Innovation

Approach

Environment

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Significance

If the investigators were able to pursue the proposed research program successfully, would the results emerging from the endeavor significantly advance the field?

Is the research potentially of high impact?

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Investigators

Does the team of investigators have appropriate expertise to successfully carry out the proposed research program?

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Innovation

Does the application challenge or refine current research paradigms by utilizing novel theoretical concepts, approaches or methodologies?

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Approach

Are the overall strategy, methodology, and analyses well-reasoned, feasible and appropriate to accomplish the specific aims of the project within the proposed funding period?

Are expected outcomes described, including potential problems and alternative strategies?

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Environment

Will the scientific environment contribute to the probability of success?

Are the available infrastructure and resources adequate for the proposed project?

Will the project benefit from unique features of the scientific environment?

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Impact	Score	Descriptor	Additional Guidance on Strengths/Weaknesses
High	1	Exceptional	Exceptionally strong with essentially no weaknesses
	2	Outstanding	Extremely strong with negligible weaknesses
	3	Excellent	Very strong with only some minor weaknesses
Medium	4	Very Good	Strong but with numerous minor weaknesses
	5	Good	Strong but with at least one moderate weakness
	6	Satisfactory	Some strengths but also some moderate weaknesses
Low	7	Fair	Some strengths but with at least one major weakness
	8	Marginal	A few strengths and a few major weaknesses
	9	Poor	Very few strengths and numerous major weaknesses

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What really matters is the percentile, which is calculated based on the scores of the current study section and the two prior study sections; new investigators are percentiled separately.

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The study section evaluates and ranks proposals according to scientific and technical merit.

The study section does not make funding decisions.

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Applicant

Submit grant application through grants.gov

Center for Scientific Review

Grant is assigned to study section

Study Section

Grant is not discussed

Grant is reviewed and scored

Institute

Grant is evaluated for funding

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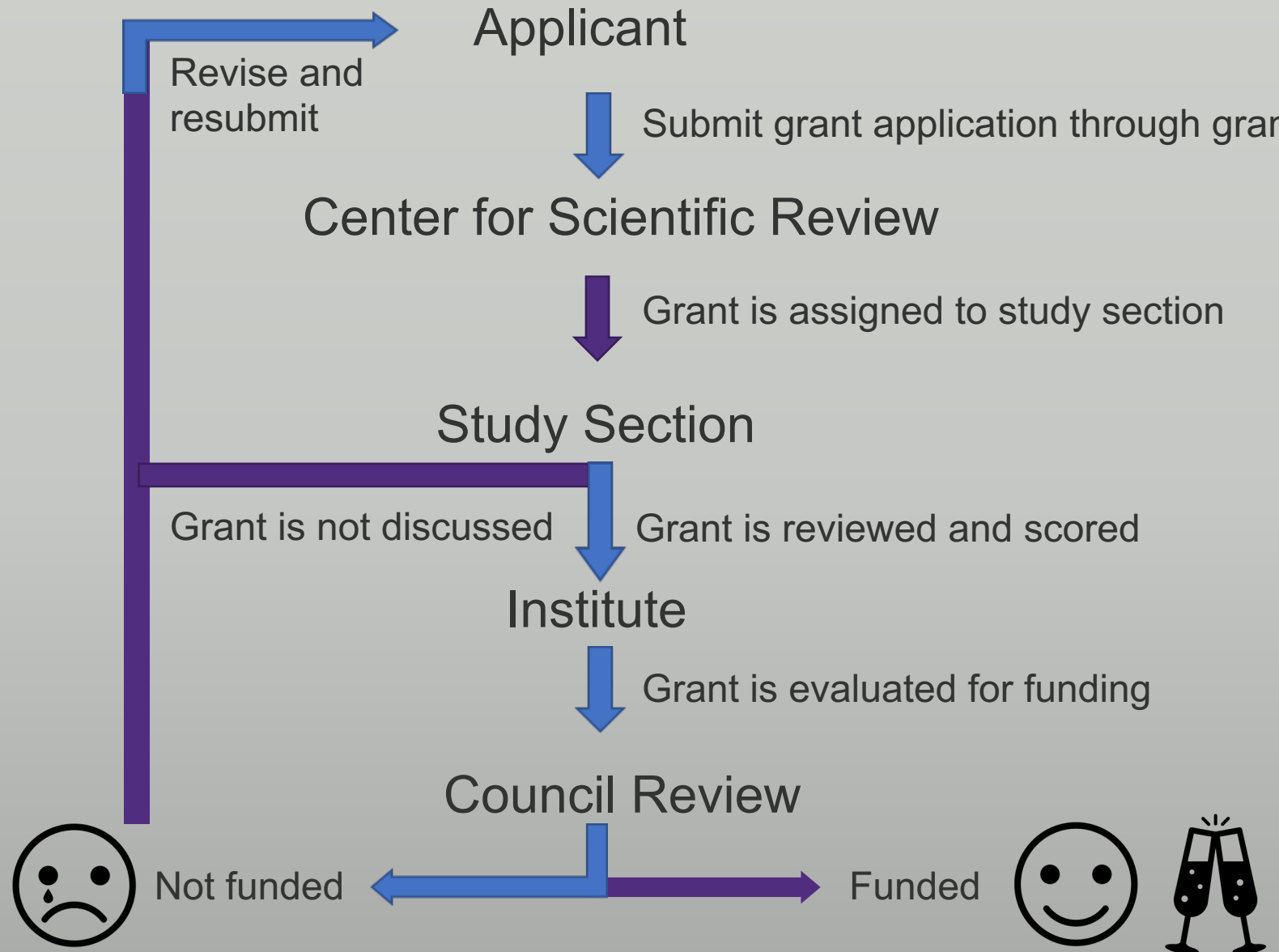

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Preparing your application



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The Specific Aims

Why?

What motivates the proposal?
Why is it important?
What important gaps in our knowledge does the proposal seek to remedy?

How?

What is the long-term objective of the research program?
How is the proposed research program broken down in achievable specific aims?

What?

What will be the major advance for the field if the proposed research program is successfully completed?

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Target the application to the review criteria

Significance

Provide the necessary background from the literature that places the proposed research program in perspective and makes it clear why the proposed research endeavor is important, timely, and likely to advance the field and how your team with your available expertise and resources is in an ideal situation to carry out the proposed research. It is not necessary to write an exhaustive literature review.

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Target the application to the review criteria

Innovation

Indicate what is conceptually or technically innovative about the proposed research strategy. Don’t be modest, but also do not use over-the-top hyperbole.

Note also that a proposal does not have to be innovative to be significant.

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Target the application to the review criteria

Approach

Present the preliminary data either as a separate section up front or with each specific aim as relevant to that aim.

Organize the research strategy by specific aim, explaining the rationale for the experimental approach, the methodology, and the expected outcomes and limitations:

Specific Aim 1: XXXXXXXXXXXXXXX

Rationale:

Experimental Approach:

Expected Outcomes and Limitations:

The specific aims need to be cohesive, but do not compose a research strategy in which specific aims are so dependent on each other that if one aim were to fail, the other aims could not be pursued.

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Target the application to the review criteria

Approach

Under experimental approach, there needs to be sufficient detail to show the reviewers that you know how to perform the experiments. It is not necessary to describe trivial details (*e.g.* “we centrifuge the sample for 10 min in a microcentrifuge and collect the supernatant.”)

Appropriate statistical analyses are essential. Rather than stating, “I will use this particular program. . . ,” indicate what the program implements, so the reviewers know that you understand the power and limitations of the analysis. Make sure you have statistical expertise on the team.

Make sure the proposed research program fits within the requested budget period and show a timeline for completion of each specific aim.

It is okay to include a Future Studies section to indicate experimental avenues that can be pursued after successful completion of the proposed research program in the specific aims.

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Some Other Stuff

Project Summary

Narrative

Biographical Sketches of all key personnel

Resource Sharing

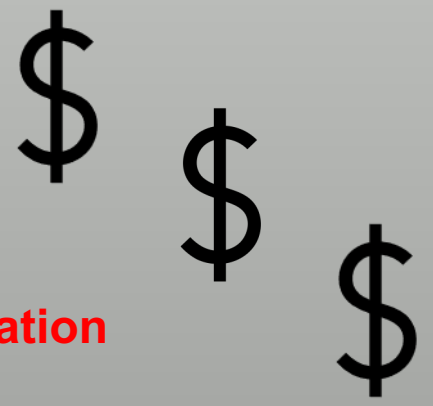
Authentication of Key Biological and/or Chemical Resources

Vertebrate Animals

Human Subjects

Hazardous Materials

And, of course, the Budget and Budget Justification



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Misconceptions



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Misconception

It is better to write an R15 or R21 before I submit an R01, because if I ask for less money, then I am more likely to get funded.

The study section evaluates and ranks proposals according to scientific and technical merit.

The study section does not make funding decisions.



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R15

Academic Research Enhancement Awards (R15) stimulate research at educational institutions that provide baccalaureate training for a significant number of the nation's research scientists but that have not been major recipients of NIH support.

Eligible institutions must have received less than 6 million dollars per year of NIH support (total costs) in 4 of the last 7 fiscal years.

(Hopefully, Clemson will soon no longer be eligible……)

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R21

The R21 grant mechanism is intended to encourage exploratory feasibility research by providing support for the early and conceptual stages of project development for up to two years (not renewable) for a maximum of $275,000 total.

- Exploratory, novel studies that break new ground or extend previous discoveries toward new directions or applications.

- High-risk, high-reward studies that may lead to a breakthrough in a particular area, or result in novel techniques, agents, methodologies, models or applications that will impact biomedical, behavioral, or clinical research.

- Projects should be distinct from those supported through the traditional R01 mechanism.

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R21

The R21 mechanism is useful for established investigators who already have R01-supported projects and would like to diversify their research program with an additional new direction.

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Maximizing Investigators Research Award (MIRA) R35

MIRA grants are offered by the National Institute of General Medical Sciences to established investigators who have R01 support or young investigators within 10 years after completion of the doctoral degree.

MIRA applications do not have specific aims but provide freedom to explore a broad research area and funding will be adjusted after a five- year evaluation rather than being abruptly terminated.

Once you receive a MIRA, you cannot have another R01 grant from NIGMS.

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Misconception

I need a lot more preliminary data before I am ready to submit an R01.



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You need only enough preliminary data to instill confidence that the proposed research program is feasible.

You cannot always predict what preliminary data the study section wants to see.

You may have to revise and resubmit, in which case the reviews will tell you what additional evidence for feasibility is needed.

You can then address these comments precisely with the next submission.

Imagine you are having a conversation with the study section when you prepare an amended application.

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Misconception

I am not allowed to contact program officers at NIH before my grant has been reviewed.



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It is part of the program officer's job to communicate with the scientific community.

It is highly recommended to contact the program officer several months before the submission deadline and ask:

(1) Whether the proposed research program is appropriate for the Institute (e-mail him/her the Specific Aims page).

(2) Whether the study section you have in mind is optimal for review of the proposal.

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Some Words of Advice

Start early!!!!!!

Communicate with the program officer.

Have knowledgeable colleagues read the draft and provide feedback.

Submit the grant on time to the Pre-Awards Office and well before the deadline; observe the rules for organization and formatting of the proposal.

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Your grant did not get funded…

Now what?.....



Jimmy Valvano, basketball coach

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Preparing a Revised Application



Of course, the reviewers are stupid, but they may have a point……

Take the reviews seriously and respond to each of them completely on the one-page Introduction to the amended application.

Be polite and express your appreciation for “the reviewers’ constructive comments.” They spend a lot of time reading your application and are providing an important service to the peer review system.

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Preparing a Revised Application

After the initial shock, discuss the reviews with colleagues “who have been there.”

It is sometimes helpful to contact the program officer and ask for further clarification on the review of your proposal. Do this only after you have received and digested the reviews and be polite.

A well-revised application is likely to fare better in the next review cycle.



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I am here to help…..

ranholt@clemson.edu
864-889-0521

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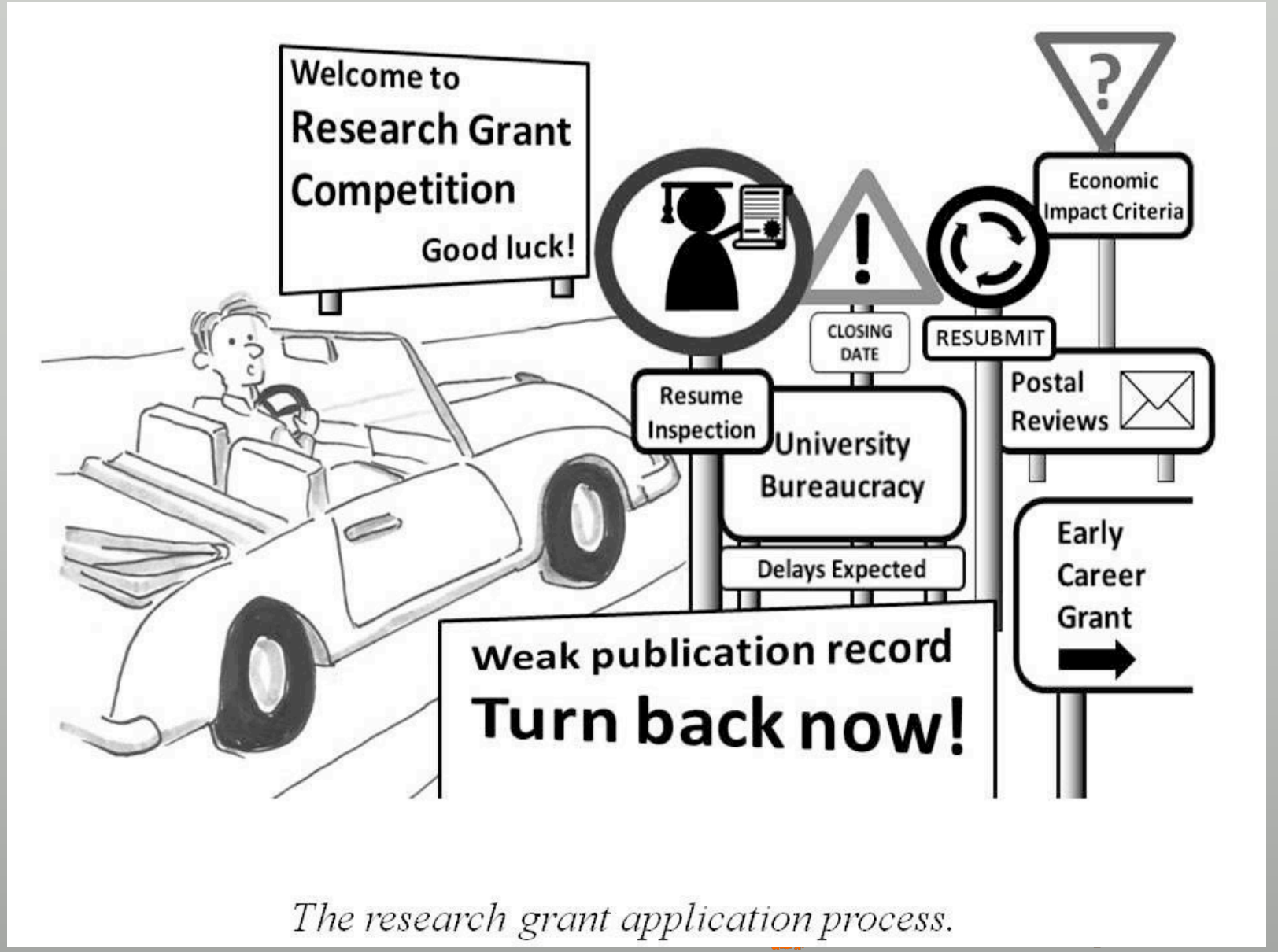
Questions?



The research grant application process.



CLEMSON
ENGINEERING
COMPUTING
APPLIED SCIENCES

How to become a successful NSF PI

Chris Paredis, PhD | BMW Endowed Chair in Automotive Systems Engineering

Disclaimer & acknowledgment

- Any opinions, findings, and conclusions or recommendations expressed in these slides are those of the author/presenter and do not necessarily reflect the views of the National Science Foundation.
- Although the presenter used to work at NSF, he does not currently have any affiliation with NSF and does not claim to represent NSF in any way.

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Overview

- NSF overview
  - What kind of research does NSF fund?
  - Organizational structure
- The lifecycle of an NSF proposal
  - The proposal writing process
  - Proposal review: Intellectual merit & broader impacts
- Becoming part of the NSF “system” and community
  - Serving on a review panel
  - Getting to know your program director

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What kind of research does NSF fund?

- NSF supports almost all fields of research
  - Exception: clinical research
- NSF is all about basic research — advancing the state of knowledge
  - Often hypothesis driven — depends on field of inquiry

Two main evaluation criteria:

- Intellectual Merit: Will the proposed work advance knowledge?
- Broader Impacts: Will the proposed work benefit society?

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National Science Foundation
WHERE DISCOVERIES BEGIN

NSF ORGANIZATIONAL CHART

https://www.nsf.gov/staff/organizational_chart.pdf

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Director



Vacant
Deputy Director



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Brian W. Stone
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Dorothy Aronson
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Find your home in the NSF organization

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NSF ORGANIZATIONAL CHART

https://www.nsf.gov/staff/organizational_chart.pdf

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Acting Assistant Director

Evan Heit
Acting Deputy Assistant Director

- Directorates
  - Divisions
    - Programs

Find the program that aligns best with your research interests

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National Science Foundation
WHERE DISCOVERIES BEGIN

NSF ORGANIZATIONAL CHART

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Get to know your program director

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The proposal writing process

- Identify your home: community, program, funding opportunity
- Learn about your community's expectations — ask colleagues for example proposals
- Do preliminary research
- Write a proposal summary — and use it to get feedback from colleagues and NSF PD
- Write the full proposal — and get feedback from colleagues
- Work with support staff to develop budget, submit everything to Fastlane, and officially submit



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Learn about funding opportunities

- Program specific
  - Look at the program website to determine scope
  - Look at recent research awards
  - Some programs have deadlines
  - Sign up for e-mail updates; nsf.gov — News — All News



- Special solicitations
  - Often larger, collaborative awards
  - Larger awards

- CAREER program
  - For assistant professors only
  - Great way to jump-start your research career

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NSF proposal best practices

- Be clear and explicit about what the new knowledge will be
  - First sentence of summary: “The research objective of this proposal is…”
  - Ideally: Novel, innovative, transformative — with broad impact
- A proposal is a plan for what you will do — provide sufficiently detailed research plan
- Keep your audience in mind: the review panel
- Convince the reviewers you are qualified and will deliver
  - Good literature review
  - Some initial results
- The “project summary” (i.e., abstract) is crucial

Read the PAPPG
(Proposal & Award Policies & Procedures Guide)

- Strictly enforced to assure fairness
- Not following the rules will result in “return without review”

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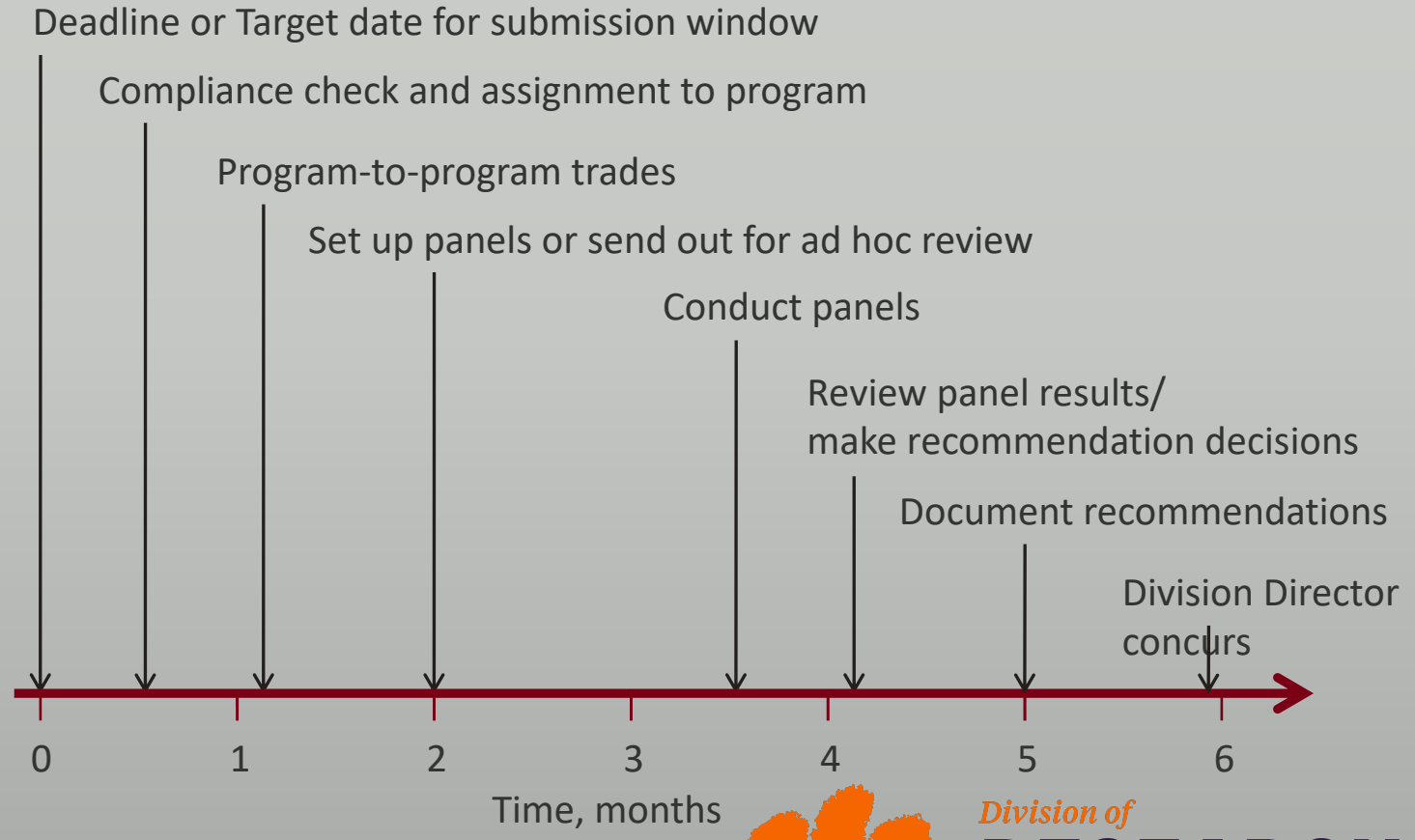
How are proposals reviewed?

- Peer review process
  - Ad-hoc — asynchronous, written review
  - Review panel — reviewers submit written review but then meet in person (or via video conference) to discuss proposal and make recommendations
- Ultimately, the program director decides



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Evaluation criterion: Intellectual merit

- What is the intellectual merit of the proposed activity?
  - New Knowledge? What is the potential for the proposed activity to advance knowledge and understanding within its own field or across fields?
  - Transformative? To what extent does the proposal suggest and explore creative, original, or potentially transformative concepts? How likely is it to revolutionize entire disciplines, create entirely new fields, or disrupt accepted theories and perspectives?

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Evaluation criterion: Intellectual merit

- What is the probability of success?
  - Good Plan? 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?
  - Qualified Team? How well qualified is the individual, team, or organization to conduct the proposed activities?
  - Adequate Resources? Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?
  - Track Record? Results from prior NSF support

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Evaluation criterion: Broader impacts

- What are the broader impacts of the proposed activity?
  - Benefit to Society? What is the potential for the proposed activity to benefit society or advance desired societal outcomes?
  - Education? How well does the activity promote teaching and learning?
  - Broad Participation? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?

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Serving on a review panel

- Why?
  - Proposal review is an important service to your community
  - There's no better way to see how the system works
  - There's no better way to understand what makes a winning proposal
- How to volunteer?
  - E-mail a brief (1-page) bio to your program director
  - Indicate your areas of expertise
- What to do when selected?
  - Leave enough time to review the proposals
  - Write thoughtful, critical, constructive reviews — this is a good way to get noticed by your PD
  - Submit your reviews on time
  - Actively participate in the discussion. Be outspoken, but respectful of the opinion of others.

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Should I meet my program director?

- **Yes.** Your program director can:
  - Give advice on proposal submission
  - Help you understand the review of a previous proposal
  - Point you to resources you can use to help write a better proposal next time
  - Give general guidance on good proposal writing
  - Give you ideas for collaborations

- If you decide to meet:
  - Be prepared to listen — you don't learn by talking
  - Be prepared with questions

PDs are successful if their community thrives

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Reaching out to your PD

- Introduce yourself at a conference
- Contact the PD via e-mail
  - Introduce yourself briefly
  - Provide some information about your research focus
  - Offer to serve on a review panel
  - Ideally: Request feedback on a 1- to 2-page draft proposal summary
    - Does the proposed research fit within the scope of the program?
    - Any suggestions that could strengthen the research questions/hypotheses?
- Cold-call the PD — not a good idea…
- Visit the PD when in Alexandria — only after setting up appointment
  - Note: some programs/divisions do not allow visits

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Summary — Questions?

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