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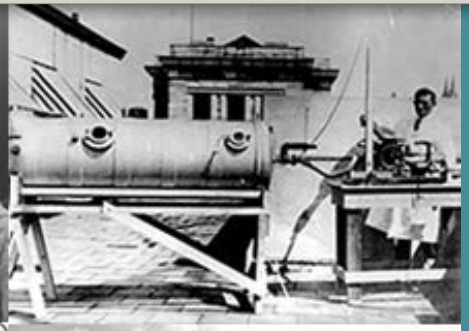
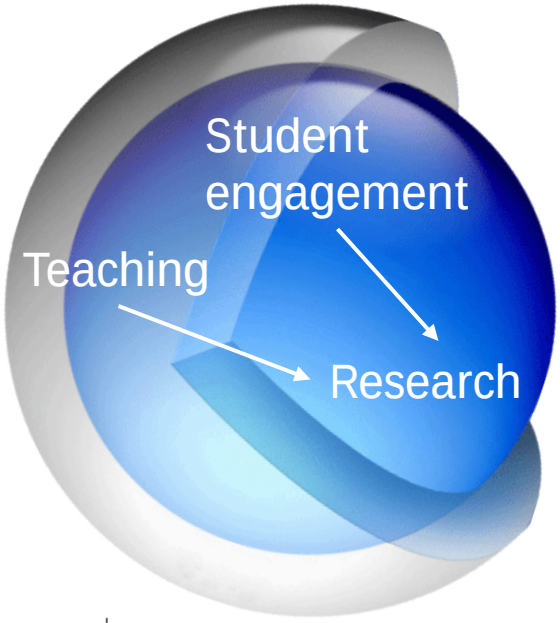


Navigating NIH: Succeeding as an Independent Investigator

Karen M. Emmons, Ph.D.
Associate Dean of Research
Office of Research Strategy & Development
Harvard School of Public Health

Faculty Life at Harvard

- Build your research program
- Develop collaborations to expand your research in innovative areas
- Develop courses, teaching expertise
- Advise, mentor



What Does It Take to be an Independent Investigator?

- Ideas for a program of research in an important scientific area
- Pilot data
- Excellent writing and communication skills
- Good organizational and planning skills
- Tenacity

FUNDING!!

How to Design a Funding Stream:
The World According to Karen

- **Identify your very best developed idea**
  - Apply for most ‘independent’ mechanism you can
  - Develop the strongest application

- **In “down times”, begin developing next idea**
  - Consider internal pilots, smaller mechanisms
  - When Idea #1 is submitted, write grant for Idea #2
  - When Idea #2 is submitted, conduct work that would address weaknesses in Idea #1 or set you up if funded

- **Until you are fully funded, try to keep a couple of ideas in the “pipeline” simultaneously**

Funding Sources

- NIH
- Corporate-Sponsored Research
- Foundations

Funding Types

- Research grants
- Pilot grants
- Gifts

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NIH Funding 101

3 Funding Instruments for Extramural Research

- **Grant**: Investigator decides the research to be designed or developed and the approach
  - ~ 84-88% of extramural awards
- **Contract**: Government decides the research to fill their perceived need and establishes detailed requirements
  - ~ 8-10%
- **Cooperative Agreement**: Similar to grants, but awarding Institute/Center (IC) and recipient have substantial involvement in carrying out the project's activities
  - ~ 4-6%

Mechanisms for NIH To Get Research Proposals

- **Investigator-Initiated Research**
  - Program Announcements (PA)
  - Unsolicited, from general institute extramural budget
  - R01, R21, R03
  - ~ 80% of awards

- **Request for Applications (RFA)**
  - Solicited; set-aside of funds for a certain number of awards
  - One-time competition to stimulate research in a priority area
  - R01, R21, R03, P01, Cooperative Agreement
  - If an RFA submission is not successful, a subsequent application should be submitted as a new application, not a resubmission
  - ~ 10% of awards

Mechanisms for NIH To Get Research Proposals, *continued*

- **Program Announcement and Special Review (PAR/S)**
  - Solicited, but no set-aside of funds
  - Reviewed by special emphasis panel
- **Program Announcement (PA)**
  - Solicited, but no set-aside of funds
  - Reviewed by standing study section

Watch for Funding Opportunities

- **NIH Weekly Guide** http://grants.nih.gov/grants/guide/
- **Harvard Catalyst Grant Central** https://grants.catalyst.harvard.edu/grants/spring/home
- **Proprietary Funding Opportunity Databases**
  - Community of Science http://pivot.cos.com/funding_main
  - InfoEd SPIN http://www.infoed.org/new_spin/spinmain.asp

NIH Investigator Status

Types of NIH Investigator Status

New Investigator

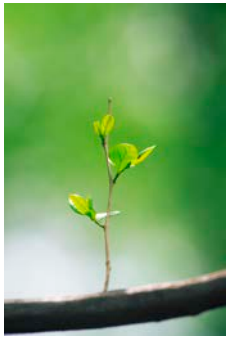
- A Principal Investigator (PI) who has not yet competed successfully for a substantial, competing NIH research grant (R01 or 'higher') is considered a New Investigator
  http://grants1.nih.gov/grants/new_investigators/resources.htm

Early Stage Investigator (ESI)

- An individual who is classified as a New Investigator and is within 10 years of completing his/her terminal research degree or is within 10 years of completing medical residency (or the equivalent)

What Affects NI/ESI Status?

- PI of an R03 or R21? *No*
- PI of an NIH contract? *No*
- PI of a grant with another Federal agency? *No*
- PI of an SBIR/STTR? *No*



- PI of a U01, specifically for a foreign investigator? *Receipt of U01 removes NI status.*
- Inheriting an R01 from a PI who moved away or died? *No*

Multiple PIs

- To facilitate multi-disciplinary, “team” science
- Think carefully before submitting MPI application:
  - *Does multiple PI approach fit the science?*
    - Each PI must play key role and/or contribute critical intellectual input into project
  - *How will multiple PI application affect your NIH funding strategies?*
    - For new investigators, inclusion in MPI application may make it difficult to establish your own identity
    - New Investigators funded through MPI will lose new PI status
    - If MPI includes established PI, application will not qualify for NI payline
  - *Must include a Leadership Plan* describing roles, responsibilities, and working relationship of the PIs
    - How will you share leadership of the project?

Multiple PIs: Additional Considerations/ Cautions

- May be more complex to write MPI proposals
  - Must have clear Leadership Plan describing roles, responsibilities and working relationships of PIs
  - May be more difficult to ensure pieces of proposal are well integrated and coordinated

- MPI applications are more difficult to get funded

Application Type	FY 2008 (in %)	FY 2009 (in %)
Multiple PI	12.6	16.2
Single PI	21.6	21.2

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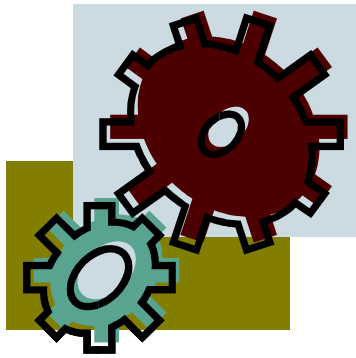
NIH Application and Funding Process

So How Does This All Work?

- You have an idea!
- You identify an appropriate **NIH institute**
- You find out about their priorities
- You talk with a **Program Official**
- You decide which of the eligible funding mechanisms are the best fit (e.g. R01)
- You watch the funding announcements and see an RFA, RFP, PAR, or PA that fits your research
- You identify best **study section**
- You write the grant!

Questions so far??



Reviewing Bodies

- Institutional Review Groups (IRG)
  - Study Section-- Review Group for CSR
- Members
  - Appointed for multi-year terms of service
  - A number of temporary ad hoc members are typically assigned to each meeting
- Special Emphasis Panels
  - Review groups formed on an ad hoc basis to review applications requiring special expertise (RFAs) or when a COI occurs

Reviewing Bodies *continued*

Review Group Descriptions Web page

http://cms.csr.nih.gov/peerreviewmeetings/csrirgdescriptionnew/

IRGs

(Institutional Review Groups)

AARR – AIDS and Related Research

BBBP – Biobehavioral and Behavioral Processes

BCMB – Biological Chemistry and Macromolecular Biophysics

BDCN – Brain Disorders and Clinical Neuroscience

BST – Bioengineering Sciences and Technologies

CB – Cell Biology

CVRS – Cardiovascular and Respiratory Sciences

DKUS – Digestive, Kidney and Urological Systems

EMNR – Endocrinology, Metabolism, Nutrition and Reproductive Sciences

ETTN – Emerging Technologies and Training in Neurosciences

GGG – Genes, Genomes and Genetics

HDM – Healthcare Delivery & Methodologies

IDM – Infectious Diseases and Microbiology

IFCN – Integrative, Functional, and Cognitive Neuroscience

IMM – Immunology

IMST – Interdisciplinary Molecular Sciences and Training

MDCN – Molecular, Cellular, and Developmental Neuroscience

MOSS – Musculoskeletal, Oral and Skin Sciences

OBT – Oncology 1 – Basic Translational

OTC – Oncology 2 – Translational Clinical

PSE – Population Sciences and Epidemiology

RPHB – Risk, Prevention & Health Behavior

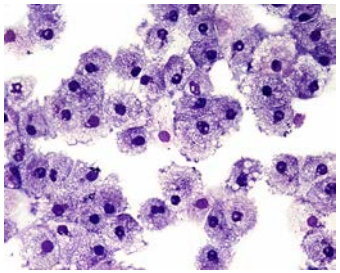
S**BIB** – Surg Sciences, Biomedical Imaging, & Bioengineering

VH – Vascular and Hematology

Cell Biology IRG [CB]

Research applications that focus broadly on the study of fundamental cell biological processes, including the functions, interactions and regulation of cells and cellular organelles. Reviews applications that involve a variety of disciplines including biochemistry, biophysics, chemistry, and genetics, and use a variety of techniques including microscopy, genomics, proteomics and computational techniques, with the primary goal of better understanding cell functions.

Topics to be covered include:



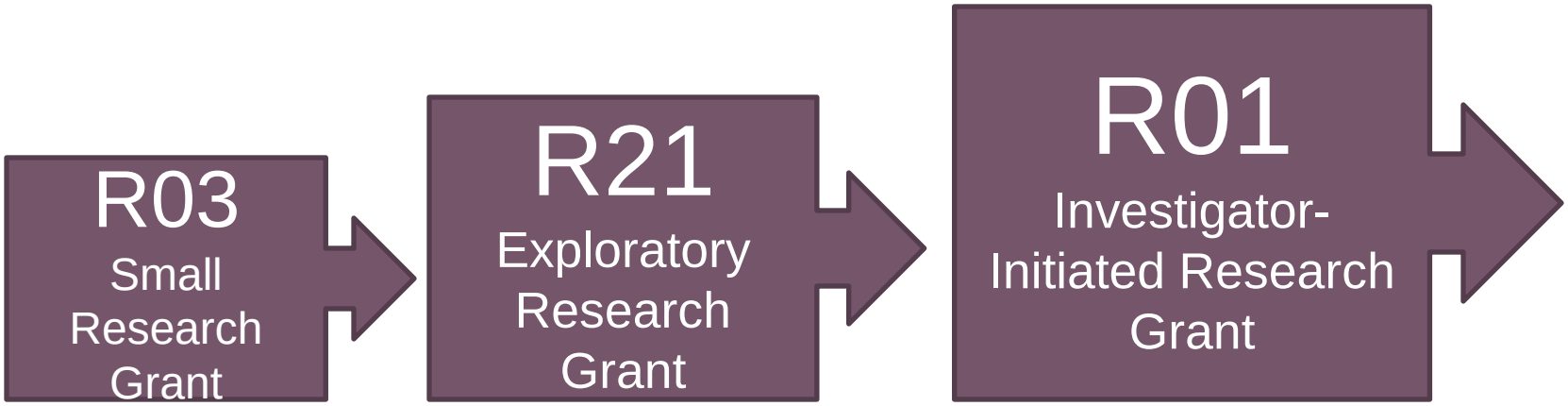
- cell growth, proliferation, and cell cycle control;
- nuclear architecture and transport;
- RNA trafficking and localization;
- post-translational modifications, protein processing, glycosylation and folding;
- membrane structure and function;
- lipid traffic and metabolism;
- cell asymmetry and polarity;
- ion transport and regulation, channels, transporters and junctions;
- organelle biogenesis, function, dynamics and protein translocation;
- the secretory pathway, endocytosis, exocytosis and phagocytosis; degradative processes;
- cell fusion; extracellular matrix and ECM receptors;
- signaling mechanisms and networks;
- integrative cell physiology including circadian clocks, stress and oxidative damage response;
- motors, filaments and cargoes; cell locomotion; mitosis and meiosis;
- programmed cell death and apoptosis

So How Does This All Work?

- You have an idea!
- You identify an appropriate NIH institute
- You find out about their priorities
- You talk with a Program Official
- **You decide which of the eligible funding mechanisms are the best fit (e.g. R01)**

Common NIH Research Mechanisms

Common R Grants



- Obtain preliminary data

- Explore a novel or high-risk research area
- Preliminary data may be included

- Hallmark of an established, independent investigator
- Often provides a steady "stream" of funding
- Must include preliminary data

Small Research Grant Program (R03)

- Discrete, well defined projects that realistically need **2 years** and **limited levels of funding** ($50K dc/year):
  - Pilot or feasibility studies, collection of preliminary data, secondary analysis, small, self-contained research projects, new technology development
- Evaluated on conceptual framework & general approach
- Justified through literature citations, data from other sources, or from investigator-generated data
- Preliminary data are not required, particularly in applications proposing pilot or feasibility studies
- http://grants.nih.gov/grants/guide/pa-files/PA-09-163.html

R03
Small
Research
Grant

Small Research Grant Program (R03)– When to Apply

- Great “starter” mechanism
- If need to generate pilot data
- For proof of concept or methods development
- Can be useful while are doing R01, providing ‘bridge’ funding

R03
Small
Research
Grant

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Exploratory/Developmental Research Grant Program (R21)

- Investigation of novel scientific ideas/ model systems, tools, or technologies with potential for significant impact on biomedical or biobehavioral research
- Combined (2 years) direct cost ≤ $275,000.
- Evaluated on the conceptual framework, level of innovation, potential to advance knowledge
- Justified through literature citations, data from other services, or, when available, from investigator-generated data
- Preliminary data are not required for R21 applications; include if available

R21
Exploratory
Research
Grant

Exploratory/Developmental Research Grant Program (R21)– When to Apply

- Novel, risky idea
- Larger scale methods development
- Can help to have a more established collaborator
- Scale of research must be appropriate for the mechanism

R21
Exploratory
Research
Grant

R01 NIH Investigator Initiated Research Project Grant Program

- Discrete, specified research project
- NIH's most commonly used grant program
- Advance permission required for $500,000 or more (direct costs) in any year
- Budget reviewed separately from science, must "match"
- Generally awarded 3 to 5 years
- Utilized by all ICs

R01
Investigator-Initiated Research Grant

R01 Grant Program – When to Apply

- Have some evidence of ability to manage external funds
- Have evidence of publication productivity
- Have sufficient support for science proposed
- Have pilot data
- Typically hypothesis-generating or hypothesis-testing
- Aim to submit during NI/ESI eligibility

R01
Investigator-Initiated Research Grant

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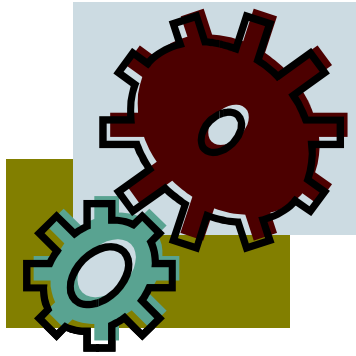
Writing an NIH Grant

So How Does This All Work?

- You have an idea!
- You identify an appropriate **NIH institute**
- You find out about their priorities
- You talk with a **Program Official**
- You decide which of the eligible funding mechanisms are the best fit (e.g. R01)
- You watch the funding announcements and see an RFA, RFP, PAR, or PA that fits your research
- You identify best **study section**
- **You write the grant!**



“Research Plan”

1. **Introduction to Application** (Resubs or Revisions Applications)
2. **Specific Aims**
3. **Research Strategy**
   a. Significance
   b. Innovation
   c. Approach
      - Preliminary Studies for New Applications
      - Progress Report for Renewal/Revision Applications
      - Research Design and Methods

Keys to Writing Your Best Possible Grant Application

- **Plan Ahead**
- **Mentor Review**
- **External Review**
- **Editorial Review**

Write the grant!

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NIH Review Process

NIH Review Process

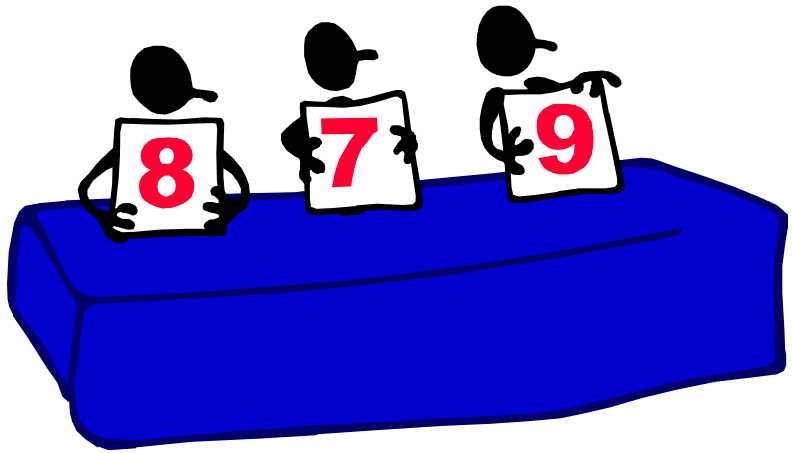
Center for Scientific Review (CSR)

CSR Study Section or Institute

- **Scientific Review Officer**
  - Completeness of application
  - Assign reviewers
- **Peer Review**
  - Written critique & numerical scores for review criterion
- Score/No Score; percentile
- Summary Statement
- Institute makes funding decisions

NIH Review Criteria

- **Overall Impact/priority score** – likelihood to exert sustained, powerful influence on field
- **Scored Criteria** (1-9):
  - Significance
  - Investigator(s)
  - Innovation
  - Approach
  - Environment



Confessions of a Reviewer

- Reviewers are busy, tired people; grant reviews are on top of their day job
- Impressions of the grant are formed early
- Of the 20-30 people on the study section
  - Likely only 1or 2 are experts on your topic
  - Likely only 3 have read your grant

- Reviewers read many grants for each meeting; “stories” are easier to remember and to convey
- If you make the reviewer work harder (e.g. complex writing, minimal margins), they may be less generous in scoring

If Nothing Else, Remember There's One Key to Success!

- You have to **sell your ideas to reviewers**
- You have to **inspire the Reviewer to be your advocate** in the Study Section

Grant is Submitted- Now what?!

- Do the Happy Dance…

- Put on Your Armor!
- Start your next grant
- Watch for Score- Make Provisional Plans
- Watch for Summary Statements
- Ask Mentors/Colleagues to read
- Talk with Program Official
- Identify Fixable/Non-Fixable Issues
- Plan Resubmission – you get one shot!

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Developing your Research Program & Funding Portfolio

How to Design a Funding Stream

- Once funded, keep an eye on your/staff coverage levels
- Plan for next funding opportunity based on progress in your science AND funding levels
- Anticipate at least a 2-year process for getting an idea funded

KE Coverage (% effort per mechanism)

KE	J 2014	F	M	A	M	J	Jul	A	S	O	N	D
R01 #1	30	30	30	30	30	30	30	30	30	30	30	30
R01 #2	30	30	30									
Sub #1	10	10	10	10	10	10	10	10	10	10	10	10
Sub #2	10	10	10	10	10	10	10	10	10	10	10	10
Dept	20	20	20	20	20	20	20	20	20	20	20	20
TOT	100	100	100	70	70	70	70	70	70	70	70	70

How to develop a research program

- Your Resources:
  - Your ideas
    - Don’t panic
    - Expose yourself to opportunities to think, learn, and explore ideas
    - Carve time out to think and write
  - Your read on the gap areas in the literature
  - Your mentors
  - Harvard Catalyst, CRISP/NIH REPORTER
  - Pilot grant opportunities

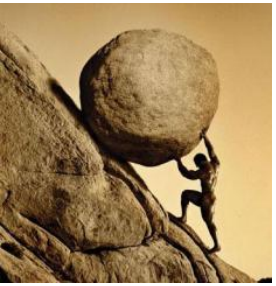
Develop a Research Program

- Pilot grant opportunities
  - Write a 2-paragraph lay-ish brief of your interest areas to share with chair, mentor, development offices
  - Watch for relevant announcements
  - Use multiple submissions, but consider complementary projects
  - Look for “add-on” opportunities

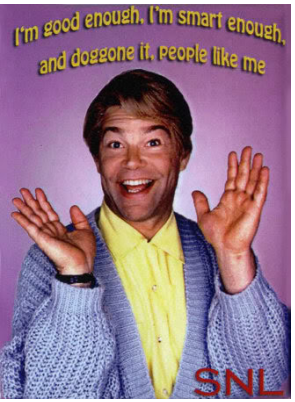
How to become funded –

- And no, it's not exactly the same as developing a research program!
- Idea
- Commitment
- Grant writing skills

Commitment



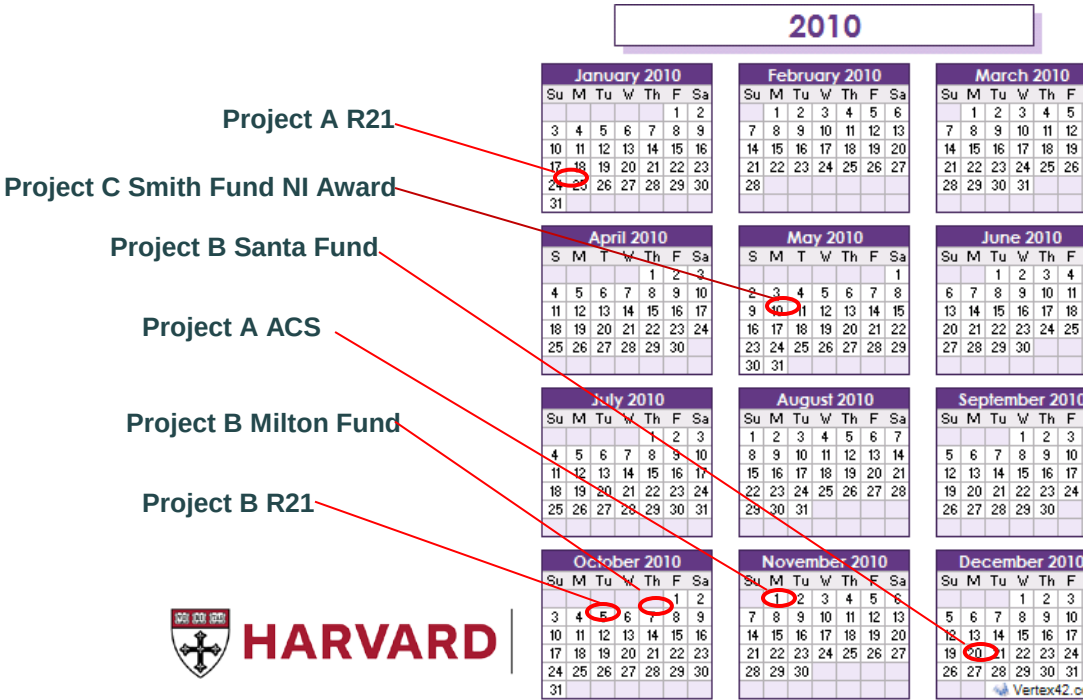
- **Passion**
- **Attitude**
  - I can't → I can and I will
  - I don't have time → I will reorder my priorities
  - There's too much competition → I welcome the chance to compete
  - It's good as it is now → It can always be better
  - I'll submit now and "get in line" → I won't submit until it's the very best grant I can write



- **Time**

Planning & Strategy

- Plan for specific grant submission deadlines, and lay out specific timeline
- Then add 2-3+ months to timeline



Questions?