

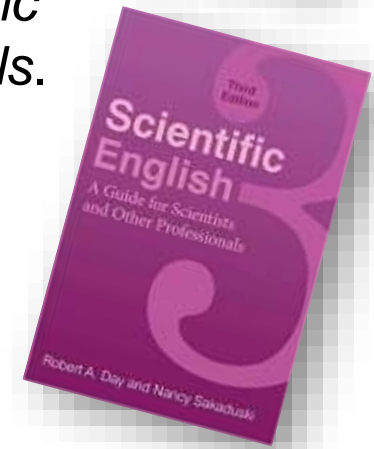
Writing Grant Proposals: The Art of Scientific Persuasion

ENGR 361: Scientific Research Communication

<https://www.csulb.edu>

References

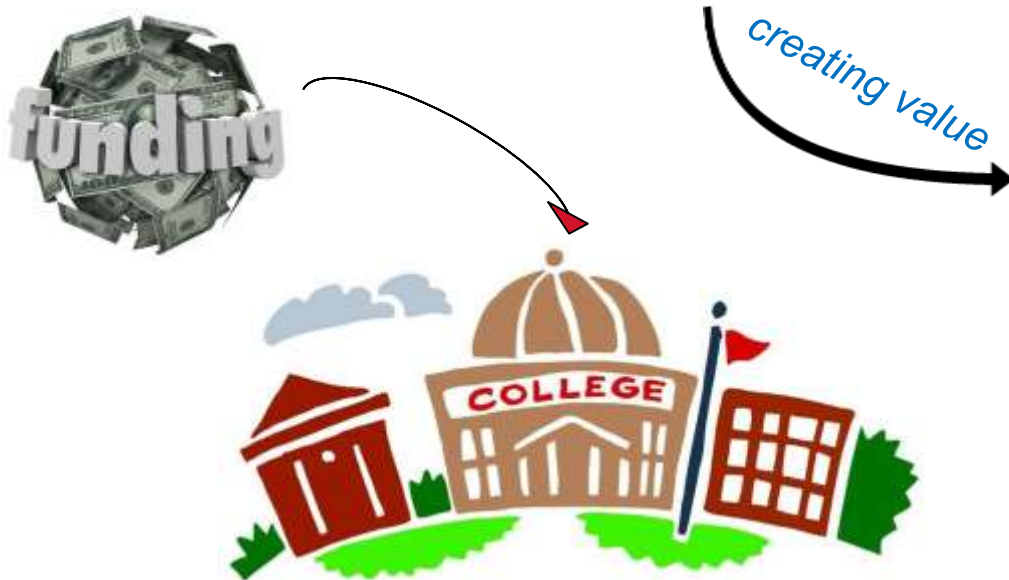
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Writing Grant Proposals

■ Research Funding

- Companies/Businesses *Make/Sell Products & Services*
- Non-Profits *Provide Services*
- Colleges/Universities *Create/Disseminate Knowledge*



Educating students
Research
Scholarship

Writing Grant Proposals

■ Types of Grants

- Investigator-Initiated
- Request-For-Proposals (RFPs)
- Seed-Money Proposals
- Small Business Initiated Research (SBIR's)
- Training Grants
- Fellowships
- ...



Writing Grant Proposals

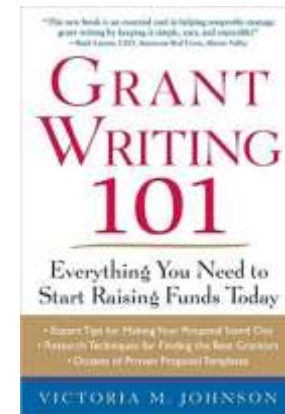
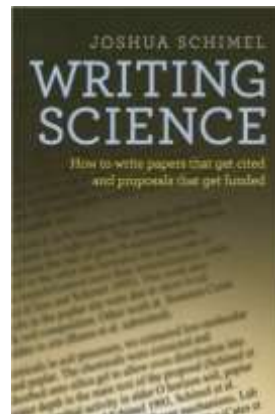
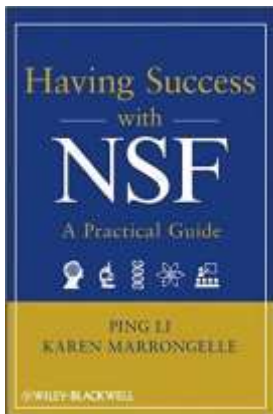
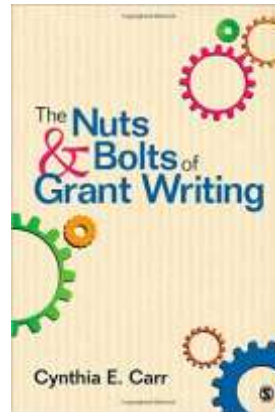
- **Grants help the Institution**

1. Funder believes in the work of the institution
2. Funder believes in the intellectual work of the PI
3. External funding leads to exciting new developments
4. Getting grants promotes institution's grant-getting ability

- Grants awarded validates the institution...

Writing Grant Proposals

■ Helpful Resources



Writing Grant Proposals



“Agreed. We fund only those proposals
we can understand.”

Writing Grant Proposals

- **The Grant Proposal**

- Request to fund a research project

- Essential Elements:

- *Vision of project*
 - *The work to be done*
 - *How much money is needed*
 - *Expected outcomes*



Writing Grant Proposals

- **The Grant Proposal**

- Key Elements of Proposal Writing

- CLARITY

- Clear writing reflect clear thinking
 - Readability is critical
 - All parts—sentence structure, paragraph structure, narrative organization—must be clear and direct



Writing Grant Proposals

■ The Grant Proposal

– Key Elements of Proposal Writing

■ PESUASIVENESS

- Give them no alternative BUT to fund the project!
- Strictly follow the funders directions about the proposal content & organization
- Write to make the reviewer your strong advocate



Writing Grant Proposals

■ The Grant Proposal

- Proposal Writing will change your life!
 - Perception of research in your field will enlarge

Identify the long-term goals of your research

Fitting your research into the field as a whole

Scope and trajectory of your field



Writing Grant Proposals

■ The Grant Proposal

— Proposal Writing will change your life

- Grant seekers learn to evaluate project ideas by their appeal to outside audiences
- You must convince others that your idea is worth pursuing/funding



Writing Grant Proposals

■ The Grant Proposal

- Proposal Writing will change your life
 - Grant seekers learn to work in teams

Research group (PhDs, techs, students, post-docs)

Collaborators
(investigators,
specialists)

Administrators/staff



Writing Grant Proposals

■ The Grant Proposal

- Proposal Writing will change your life
 - Grant seekers learn to explain their research and administrative expertise

Research plan
MUST be clearly
articulated



Writing Grant Proposals

■ The Grant Proposal

- Proposal Writing will change your life
 - Grant seekers learn to think in terms of what is possible

Time constraints
given institutional
setting

Number of
people working
on the problem

Budget:
Resources needed
for project



Writing Grant Proposals

■ The Grant Proposal

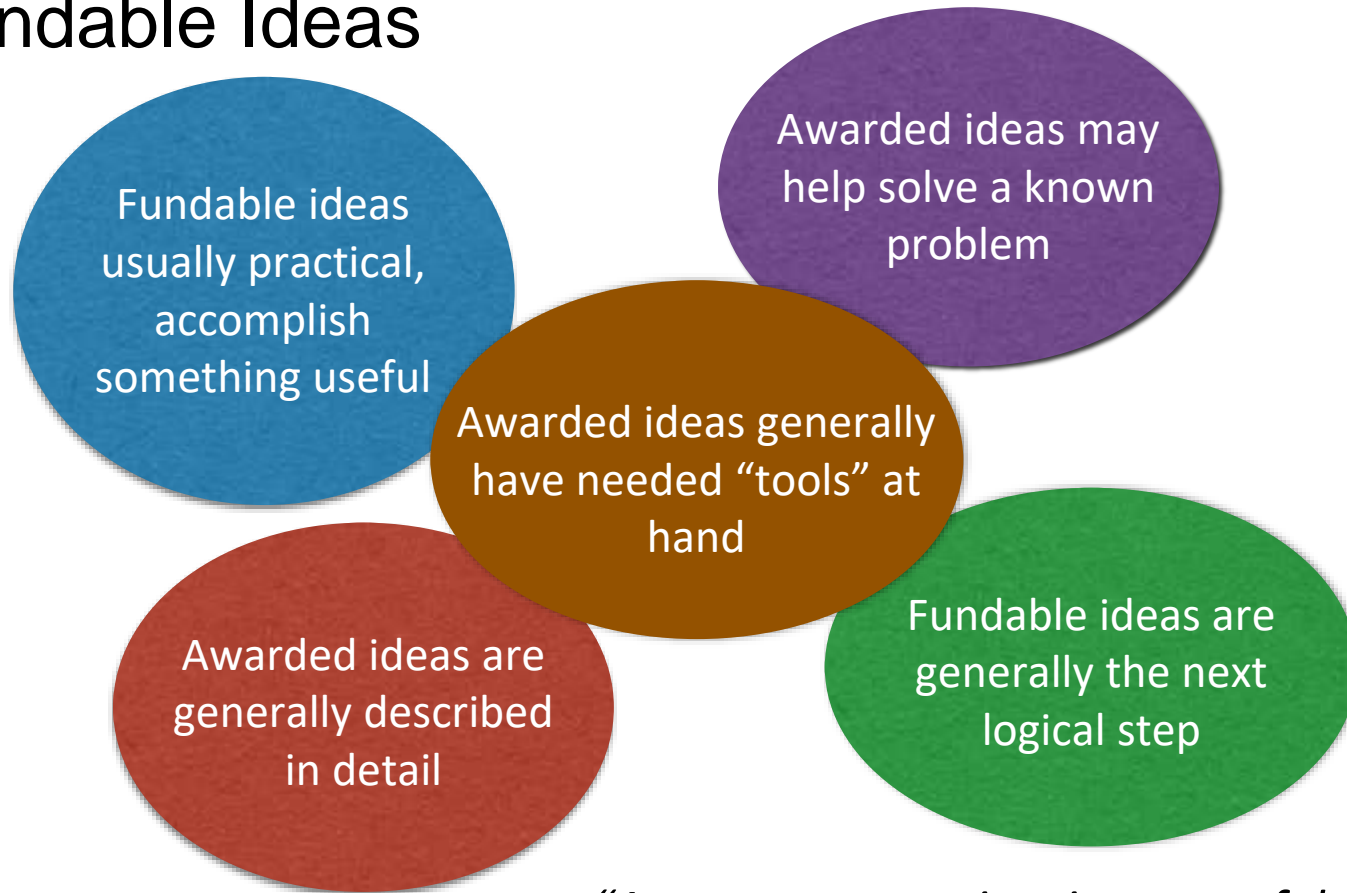
— Proposal Writing will change your life

- *How will money be spent?*
- *What activities will meet specific aims?*
- *How do specific aims progress toward long-term goal?*
- *Why am I the right person to do this project?*
- *Why is my institution the right place for this project?*
- *What expertise do my collaborators bring?*



Writing Grant Proposals

■ Fundable Ideas



“Assume your project is successful...what then?”

Writing Grant Proposals

■ Parts of a Grant Proposal

- Narrative
 - *Background & Significance*
 - *Long-term goals*
 - *Project description*
 - *Specific aims*
- Budget
 - *Translating the project into financial language*
 - *Narrative and justification*
- Sundry Documentation
 - Statements of institutional support
 - Facilities, instrumentation
 - CVs of co-PIs, collaborators

- *Methods*
- *Troubleshooting*
- *Anticipated outcomes*



Writing Grant Proposals

■ Problem Statement

- A clearly stated problem should permit clear description of overall goals and specific aims
- All hypotheses should be testable



Writing Grant Proposals

- **Goals**

- Goals reflect a vision of what the research seeks to accomplish in the long run.
- Example:
 - ***‘The long-term goals of these studies are to identify the molecular mechanisms responsible for the occurrence and characteristic features of infantile hemangiomas in humans.’***

Writing Grant Proposals

- **Objective**

- The more immediate outcomes of studies

- Example

- ***‘The objective of the proposed studies is to obtain insight into the molecular mechanisms responsible for the initial rapid growth and subsequent slow involution of hemangiomas.’***

Writing Grant Proposals

■ **Specific Aims**

- Specific aims serve as practical guide posts for daily, weekly and monthly research efforts
- Examples
 - Aim 1: **Screen for genetic loci in familial hemangiomas by** linkage mapping and loss-of-heterozygosity (LOH) analyses.
 - Aim 2: **Screen for candidate gene mutations in** sporadic hemangiomas.

Writing Grant Proposals

■ **Specific Aims**

- The aims serve as short-term goals
 - Enable the investigator to reach objectives on the way towards the long-term goals
- Structured so that they are interrelated but not sequentially independent
- Successful completion of one aim should not be prerequisite for starting work on the next aim
- Design grant so that work can be performed on two or three specific aims simultaneously

Writing Grant Proposals

- **Specific Aims & Methods**

- The aims implicitly prescribe experimental methods for their fulfilment
- Methods and detailed procedures should logically result from specific aims
 - Not to be chosen because the investigator knows how to perform these procedures

Writing Grant Proposals

■ **Background & Significance**

- Long term goals and specific aims addresses a significant need for better understanding of an topic of investigation
- Requires comprehensive, in-depth, critical analysis of the research literature
- Before starting a research project think about its significance
 - What is scholarly intriguing?
 - What areas are less developed and challenging?
 - What questions have noteworthy biological and medical ramifications?

Writing Grant Proposals

■ **Experimental Strategies & Methods**

- Experimental strategies are crucial for the success of the research project
- Innovative methods can enhance a project
- Include alternatives to the planned procedures
- Any significant finding should be corroborated in different ways by different techniques

Writing Grant Proposals

■ In-Class Activity

- Create a group of 3 – 4 students
- Brainstorm ideas with your group
- Answer the following questions
 - *What is the long-term goal?*
 - *What is the objective?*
 - *What is your hypothesis?*
 - *What are your specific aims?*
 - *What is your proposed method?*

Writing Grant Proposals

■ In-Class Activity

- The body of the Prospectus should be 250-300 words (double-spaced) and should contain the following parts:
 - **Problem Statement** (or Needs Assessment, if you prefer)
 - **Project Long Term Goal, Hypothesis, and Specific aims** (2-3)
 - **Project Methods or Design**
 - **Project Evaluation**
 - **Outcomes and Impact**
 - **Budget**
 - **References**

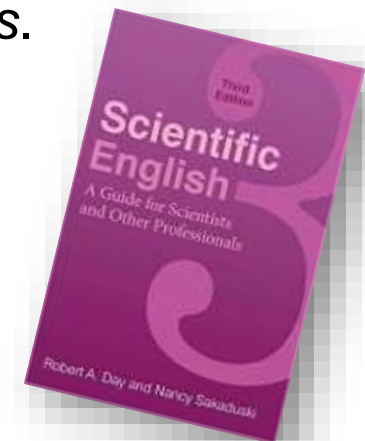
The Grant Life Cycle

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The Grant Life Cycle

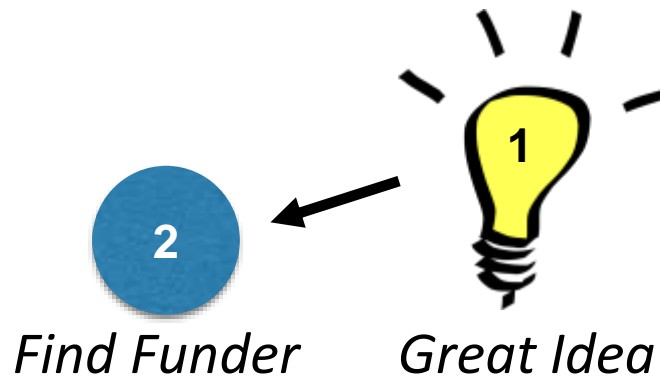
- Poorly-written proposals with good ideas may be funded
- Good writing will not save a weak idea



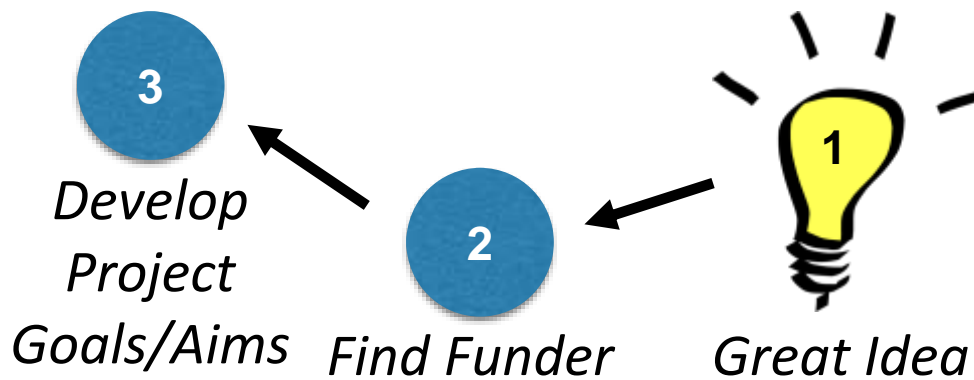
Great Idea

The Grant Life Cycle

- Proposals with a great idea sent to the wrong funder will not be awarded!

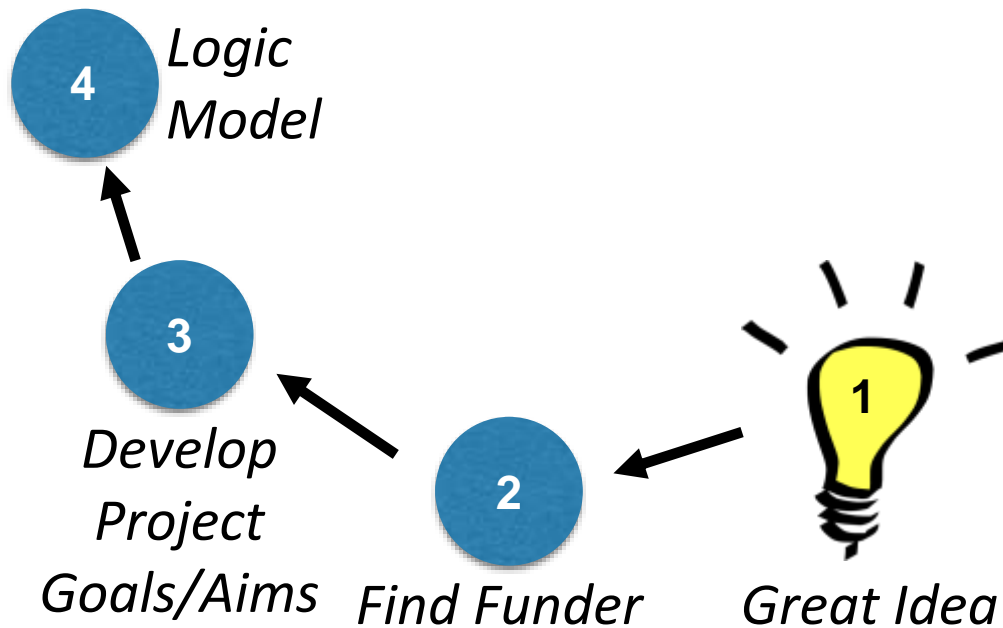


The Grant Life Cycle



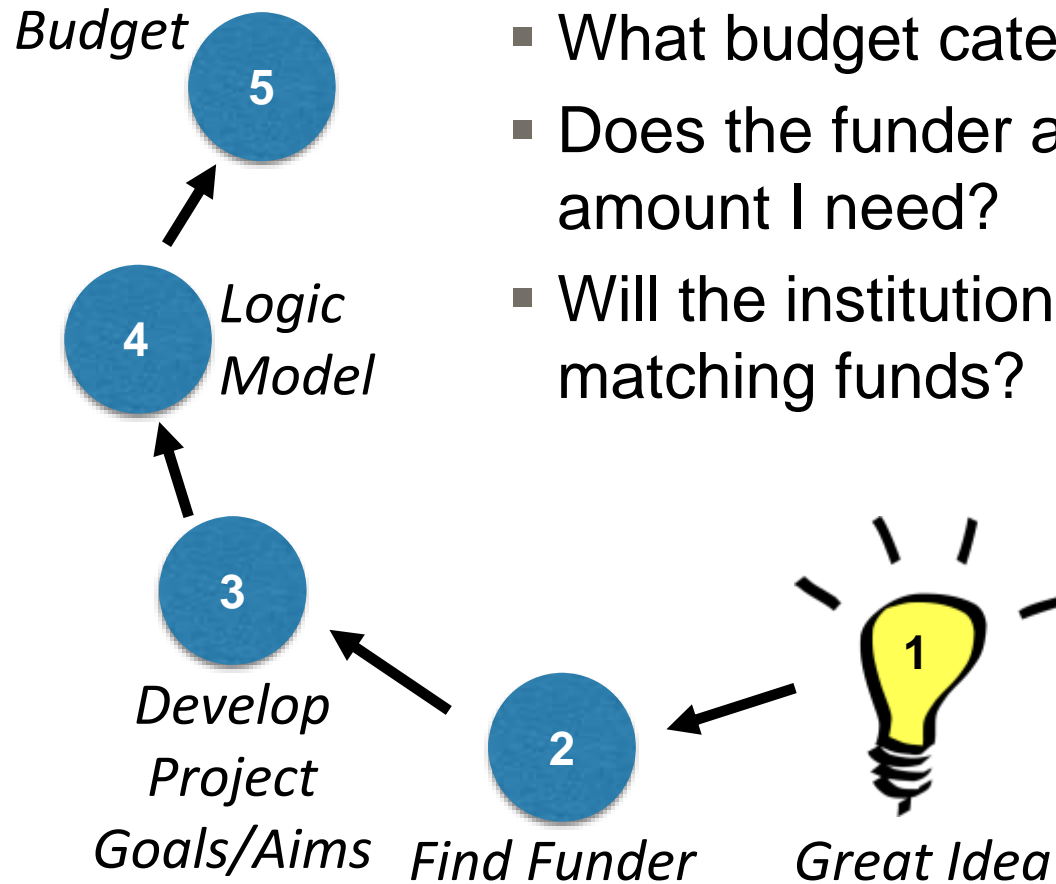
The Grant Life Cycle

- Will the activities meet proposal's specific aims?
- Do the specific aims advance toward the long-term goal?
- Are the tools/specialists needed available?

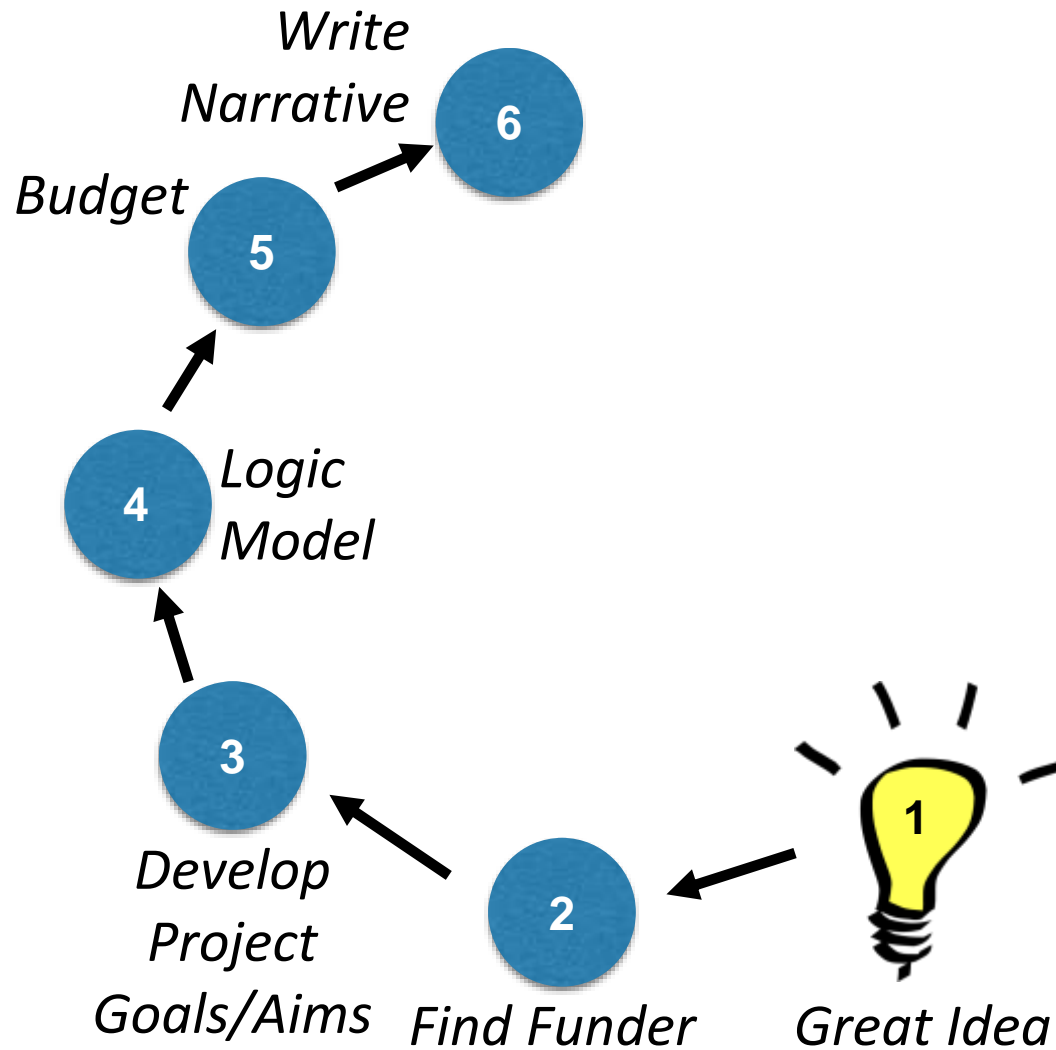


The Grant Life Cycle

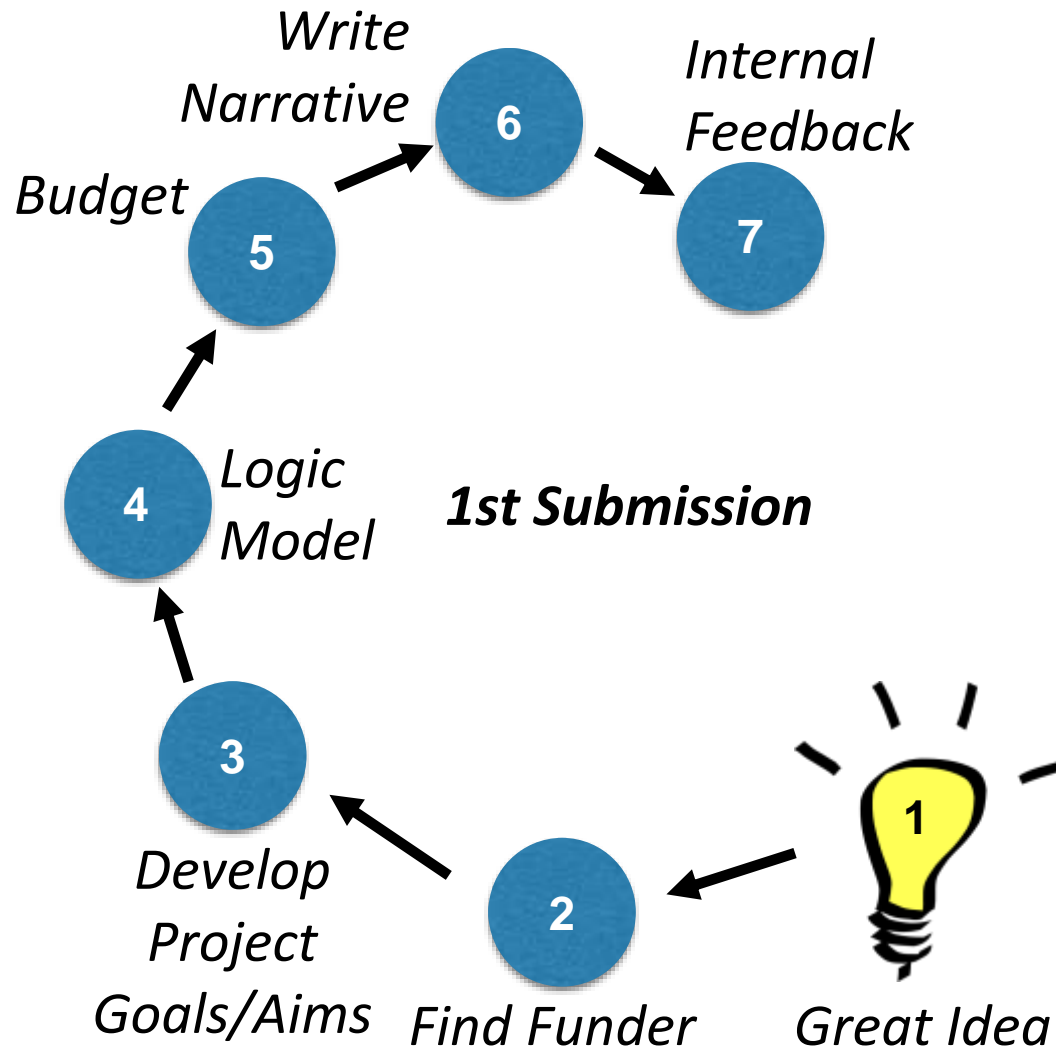
- How much cash do I need?
- What budget categories do I have?
- Does the funder award grants of the amount I need?
- Will the institution provide support or matching funds?



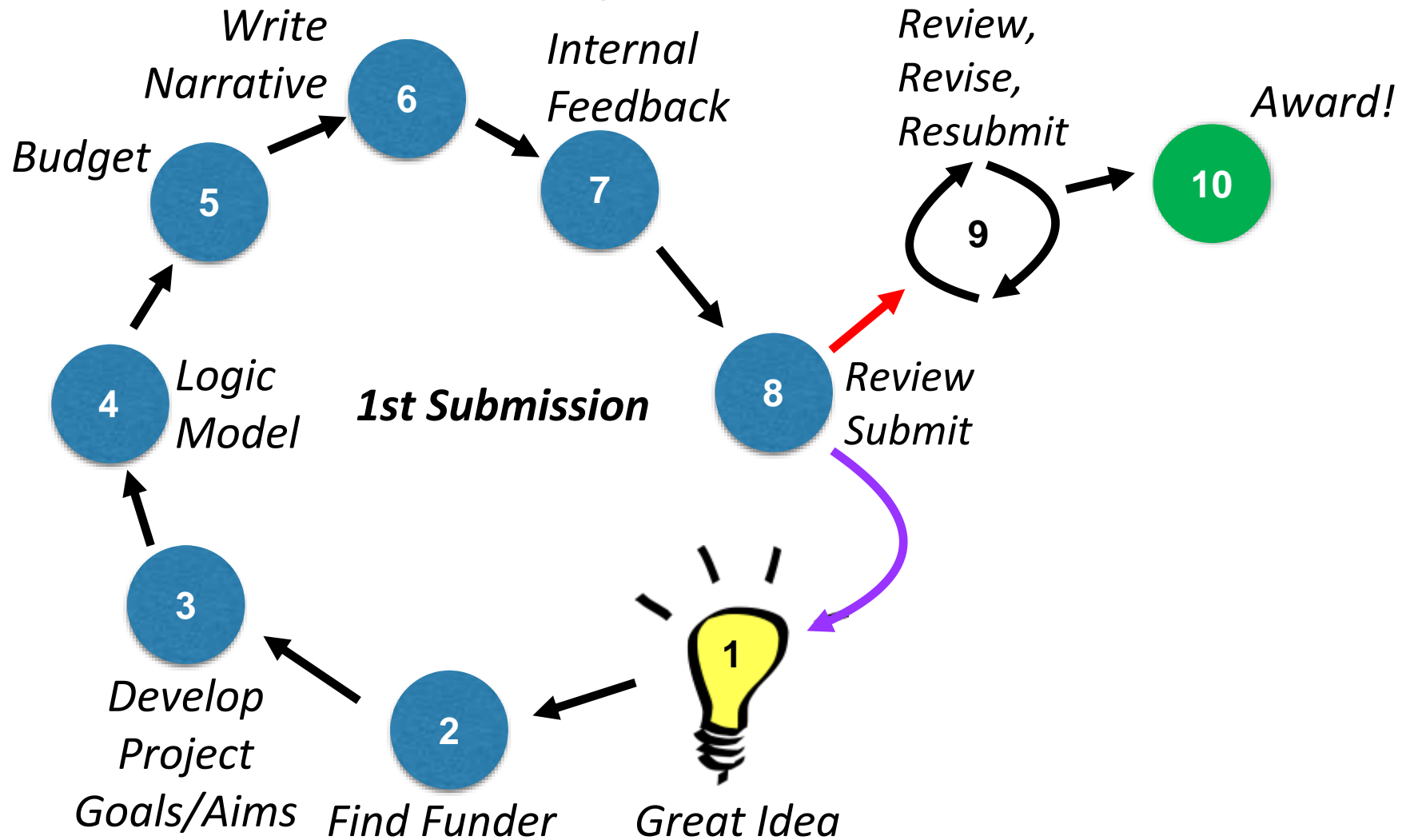
The Grant Life Cycle



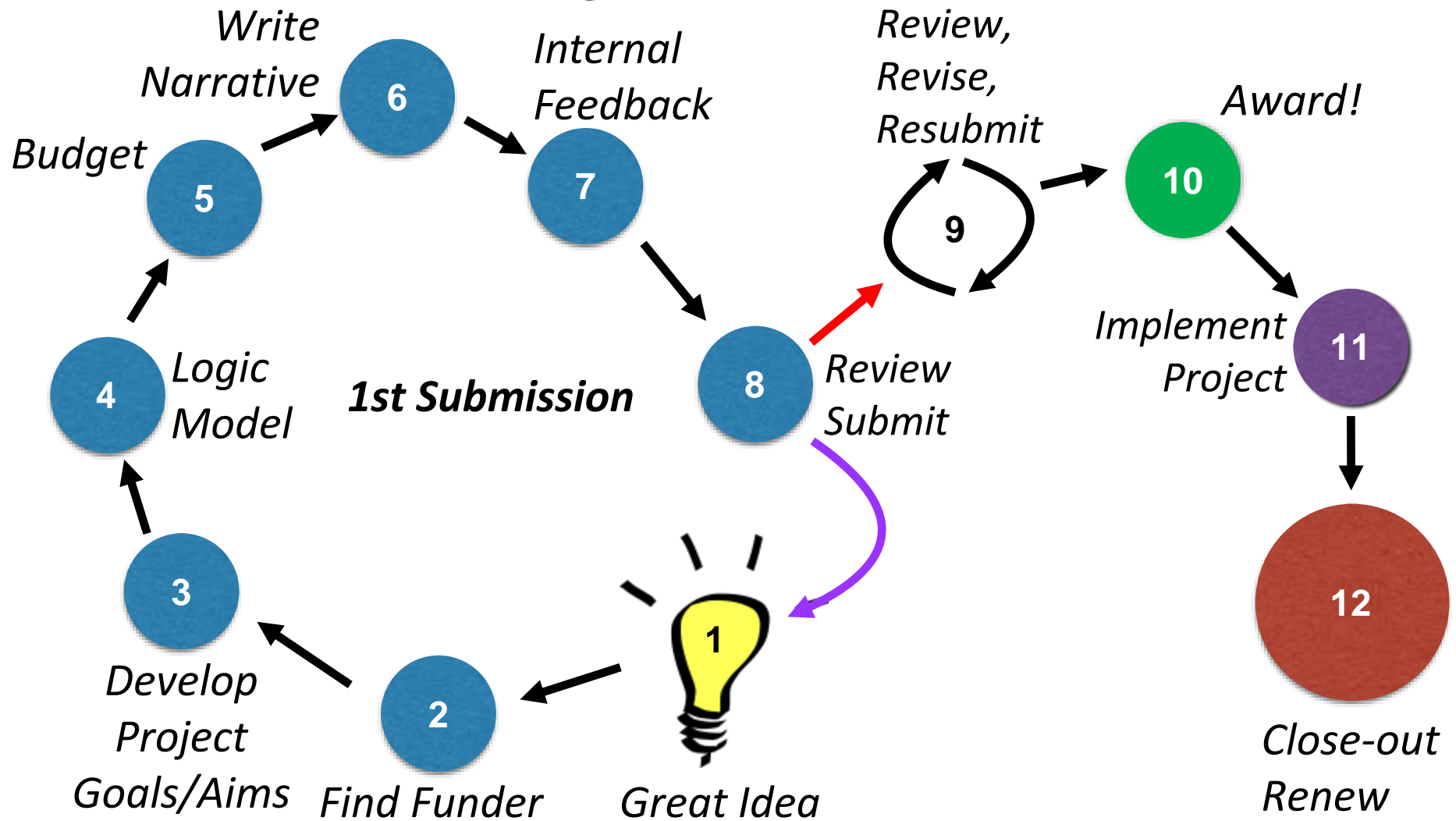
The Grant Life Cycle



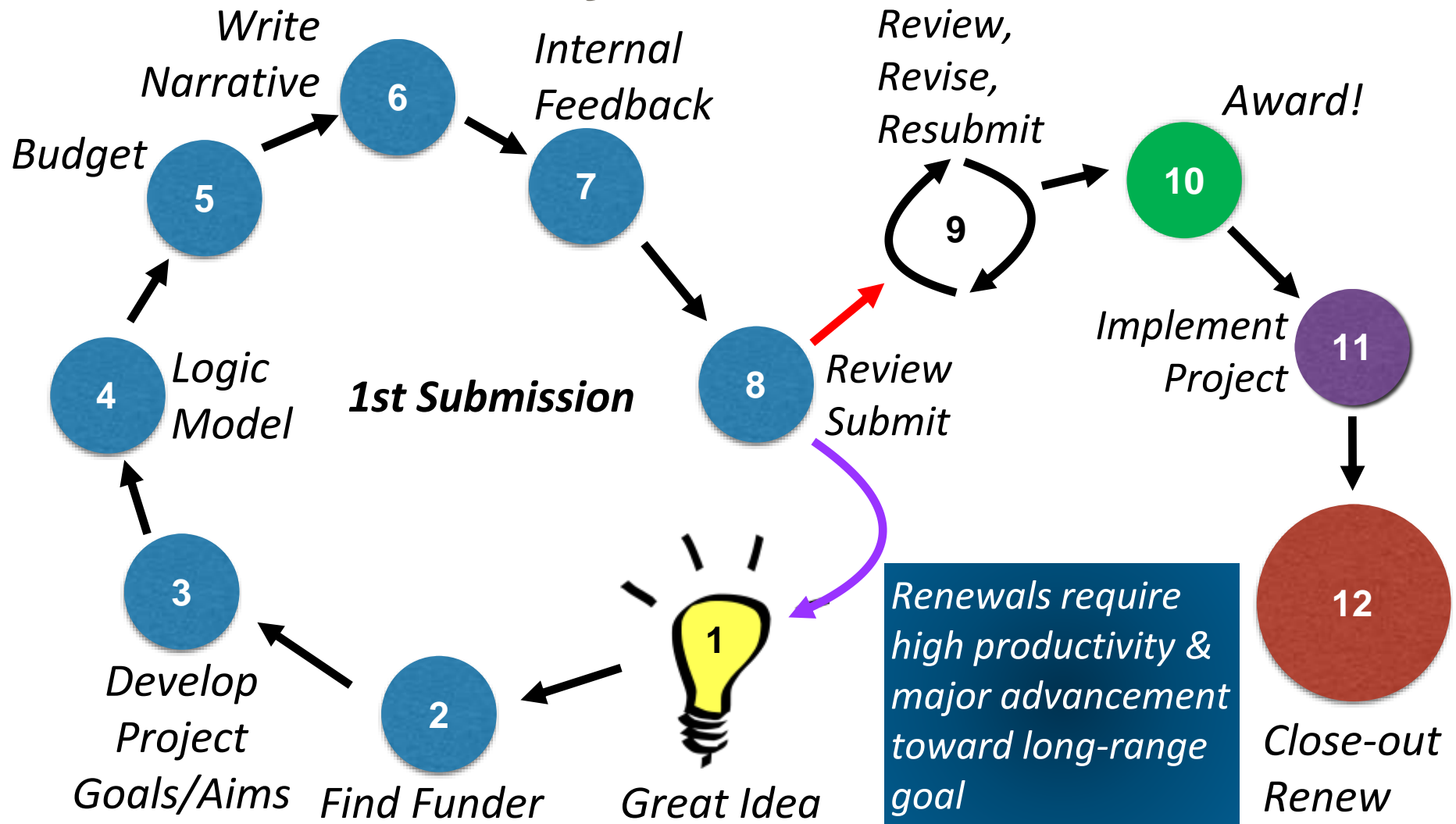
The Grant Life Cycle



The Grant Life Cycle



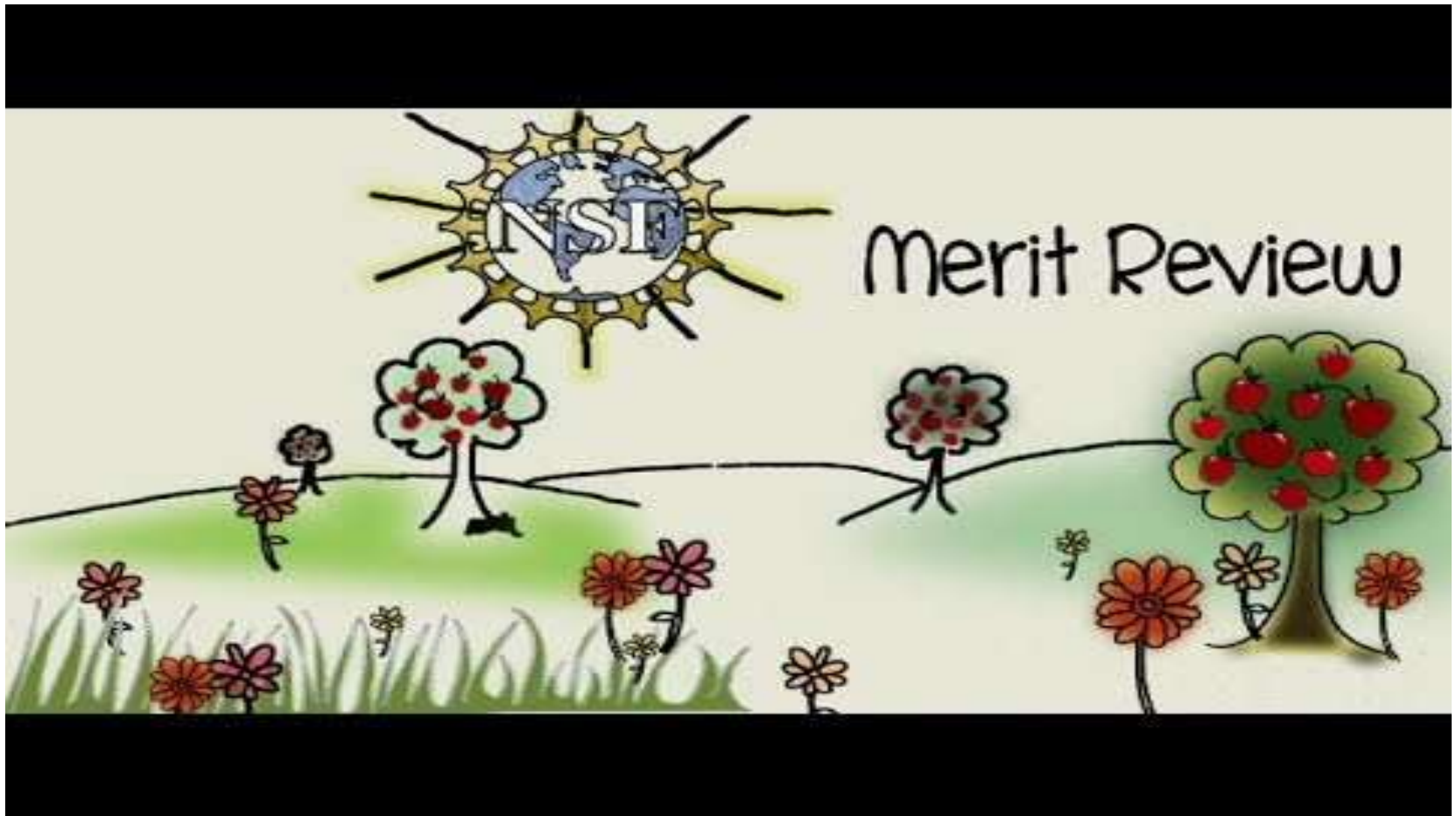
The Grant Life Cycle



Funders

- Sending your proposal to the right funder is crucial
- **Foundations**
 - Private
 - Semi-private/public
 - Philanthropists/Corporations
- **Science Associations**
 - Funded through private donations
- **Governments (local, state, fed)**
 - Funded through tax revenues
 - Allow collaborations
 - Allow multi-year funding
 - Finding comprehensive
 - Peer-reviewed
- **Colleges/Universities**
 - Smaller amounts via intramural grants (seed money)

The Grant Life Cycle



<https://www.youtube.com/watch?v=WMoGdlFgy5>



CALIFORNIA STATE UNIVERSITY
LONG BEACH

The Grant Life Cycle

- **Question to ask before submitting a Proposal**
 - Is the work novel, exciting, and necessary?
 - Are you repeating experiments already done by others?
 - Do you have preliminary data or evidence to support the feasibility of the proposed studies?
 - Are the experiments that you are proposing appropriate?

The Grant Life Cycle

■ Common Problems with Research Proposals

- Problem not important
- Shaky hypothesis/ alternative hypotheses not considered
- Unsuitable methods
- Controls not included
- Failure to realize the complexity of the problem
- Too little detail
- No recognition of potential pitfalls
- Overambitious research plan
- Lack of focus
- Rationale for experiments not provided
- No consideration of statistical power

The Grant Life Cycle

■ **Proposal Abstract**

- Proposal Summary
- Problem Statement
- Project Objectives
- Project Methods and Design
- Project Evaluation
- Outcomes and Impact
- References

■ **Proposal**

- **Project Abstract**
- Research Question (hypothesis)
- Specific Aims (prepare 2 aims)
- Background/Significance
- Methods/Research Plan
 - Design
 - Sample/Sample Size
 - Setting
 - Protocol
 - Analysis plan
- Outcomes and Impact
- Timeline
- Budget
- References

The Grant Life Cycle

- NIH Peer Review Process Revealed



<https://www.youtube.com/watch?v=fBDxl6l4dOA>

