Specific Aims Pages Part 2: The Story of Your Science

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Part 1: Specific Aims Page Recipe

1. Introductory Paragraph – *Definition of problem, critical need, proposed solution*

2. Proposed Solution – *Your objectives & rationale, “what why who” paragraph*

3. Specific Aims “paragraph” – *Steps to addressing critical need*

4. Significance – *Novelty, expectations & impact, “payoff”*

Introduction to the Specific Aims Page of a Grant Proposal

Andrew A. Monte, MD, and Anne M. Libby, PhD

ABSTRACT
Grant writing starts with crafting an effective specific aims page. This page should be a succinct combination of sales pitch and science. The specific aims page demonstrates a problem and a gap in current knowledge and suggests a solution. It proposes aims that work toward a defended solution and reveal the impact of the proposal on the problem, the field, and future research. The language must be efficient and persuasive; the presentation must drive a reviewer to support the proposal. Here we present a recipe for an effective specific aims page.

INTRODUCTION TO THE SPECIFIC AIMS PAGE OF A GRANT PROPOSAL
Grant writing starts with the iterative development of a specific aims page. The aims page serves as a concept sheet with project milestones, hypotheses, and the most important elements of the approach. Methods are likely to be successful, and the applicant is the right person and team to do the project. While these goals seem simple, conveying these elements efficiently and coherently is challenging. If the specific aims page is confusing, boring, or overly controversial then reviewers may be lost as advocates. In contrast, an effective aims page predisposes the reader to stay...
Obey **cultural norms** of disciplines, review groups

Hypothesis placement, approach under aims, figure

Everyone has a **unique voice**, and may use somewhat **nontraditional techniques**

**Emphasize your Story**
Sticky Ideas are SUCCESSful

**Simple** – simplest possible

**Unexpected** – novel or gap

**Concrete** – empirical vs. abstract

**Credible** – what’s the source

**Emotional** – tap into unknown, curiosity

**Stories** – Who’s the hero, villain, journey, resolution
Suspenseful Writing

• TED-Ed Lessons: Writers Workshop
  https://ed.ted.com/series/the-writer-s-workshop

• Fear of Unknown…anticipation and suspense by establishing a Question

• Evoke curiosity, horror, mystery, sympathy, worry, wonder
Storytelling Features

- **Point of view** (researcher, patient, provider)
- **Imagery** (blood red, sirens blaring, “Doctor stat to room one!”)
- **Pacing**: short sentences, fragments…speed
- **Silence**: pauses, moments of reflection
- **Remember closure for emotional release!**
Everyone has a **unique voice**, and may use somewhat **nontraditional techniques**

**Composite case** study to illustrate the human impact

Consider a form of **narration**

Present a **puzzle or challenge or surprise**

Use Journalists **Lede** *(invert pyramid)*

**Imitate styles** that you like
Exercises for Small Groups

1. What is dramatic or exciting on your aims page?
2. Who/what is the hero and the villain? How will this story achieve resolution?
3. Pick 6 keywords from aims page
Exercise: Six Word Memoirs

Hemingway: “For sale: baby shoes, never worn.”

Smith Magazine asked readers to tell life story in just six words, signed with Harper for Six-Word Memoir series

Six Word Memoirs on Love & Heartbreak

Six-Word Memoirs by Teens Famous & Obscure

http://www.sixwordmemoirs.com

• Write 6 word memoir using 2+ keywords
Get Help from outside readers

• **Avoid defensiveness**: if reader is confused then writer has not been clear enough

• **Ask open-ended questions**: What do you think this is about? What’s the most exciting part of this? Did you ever need any information before it came? Want do you want to know?

• **Inject your voice, enthusiasm**

    Thank you!
Better Biographical Sketches
Part 2: Workshop

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Objectives

1. Complete draft NIH Biographical Sketch (SF424 compliant!)
2. Improve your “Investigator” score
3. Learn how to tailor biosketches to proposals
Investigator score rubric:

Are the investigators well suited to the project?

If early stage...appropriate experience & training?

Complementary and integrated expertise?

Governance and organization appropriate?

Biosketch is main source for this score
Components of the Biosketch

Education/Training

Section A: Personal Statement

Section B: Positions and Honors

Section C. Contribution to Science

Section D. Research Support
Section A. Personal Statement

Can speak to reviewers in *first person*

Connect using *your voice*, who you are and why you are the right leader for the proposal

Stay on front page (less is more)

Tailored to various types of projects, expertise

Stock phrases to grab from NIH examples
In summary, I have a **demonstrated record** of accomplished and productive research projects in an area of high relevance for our aging population, and my **expertise and experience** have prepared me to lead the proposed project.

I have the **expertise, leadership, training, and motivation** necessary to **successfully carry out** the proposed research project.

I have published several studies of ..., and have led the analyses and published several ... studies, **which is the role I will take as co-investigator in this study.**
Personal Statement

Prepare by connecting with your personal and professional motivations

Convey enthusiasm and commitment

AND if you draft for co-investigators/mentors

May use citations or links, but consider strategically

Persuade with specifics
Section B. Summary

Do add present position with dates and details

Do include pertinent professional memberships

Do NOT add honors that are not directly supportive (tangential, historical)

Do NOT list fellowships, better in training table
Section C. Contribution to Science

Annotated Bibliography with details:

a. Historical background framing scientific problem
b. Central findings
c. Influence of findings on progress of science/field
d. Your specific role in the described work, esp. when team science

Framing your expertise, relevance to project
Strategically Choose Contributions

Like Personal Statement, tailor to the grant

E.g. Mentored research, policy research, clinical trials, toxicology, emergency medicine clinician expert

List of Published Work in NCBI Bibliography:

Choosing your 4 (Max) Citations

Use strategically to highlight pertinent expertise, productivity, partnerships

Favor peer reviewed publications over other products of scholarship

Favor papers on which you had leadership role

If too few, consider lumping/splitting other areas
Section D. Research Support

1. Ongoing Support—any source

2. Support Completed in Past 3 Years
   
   DO Keep formatting consistent

   DO give brief overall goal of project

   DO give role on project and PI name if not you

   Do NOT list funding amount/effort
Written and Unwritten Rules

Follow *current* formatting rules

5 pages max

No additional sections

Up to 5 contributions to science

Breadth for broad projects

Depth for narrow projects

Other scholarship OK like abstracts, podcasts

Keep older funding if needed/pertinent

Update myncbi every time you have a new publication

*Bold your name*

Sloppy biosketch = sloppy science
Exercises for Small Groups

1. Describe the main subject of the grant from the personal statement and contributions to science?

2. Describe the PI’s area of expertise and a unique or standout feature of their education and training.

3. What is this person’s role in the project?
How grants are scored

Jeffrey A. Kline, MD
Not from the NIH
The NIH Peer Review Process

Application received – CSR*
Assignments made

Initial peer review
SRG; study section
IC or CSR*
Scientific Review Officer

Second level of review
Council or Board (IC)

Funding considerations
Institutes or Centers (ICs)
Duals possible
Program Officer
Funding decisions
IC Director

Award!

*CSR = NIH Center for Scientific Review
Scientific Review Officer (SRO)

- First level of peer review
  - Designated Federal Official
  - Extramural scientist administrator
  - Identifies and recruits reviewers
  - Manages conflicts of interest
  - Oversees arrangements for review meetings
  - Presides at review committee meetings
  - Prepares and releases summary statements
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Peer Reviewers

• **Recruitment**
  – Expertise
  – Stature in field
  – Mature judgment
  – Impartiality
  – Ability to work well in a group
  – Managed conflicts of interest

– Balanced representation

• **Gender**
• **Geography**
• **Diversity**
• **Seniority**

– Availability
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Types of Scientific Review Groups (SRGs)

• “Chartered” SRGs
  – Multiyear terms
  – Formal appointment process
  – May include temporary members for special expertise

• Special Emphasis Panels (SEP)
  – Ad hoc membership
  – Often meet only once
Types of Reviewers

- **Regular reviewers – permanent and temporary**
  - Preliminary impact/priority scores, criterion scores, written critiques
  - Final impact/priority scores

- **Other Contributing Reviewers (“mail” reviewers)**
  - Written critiques, criterion scores, preliminary impact/priority scores
  - *Cannot* submit final impact/priority scores
Reviewer Assignments

• For each application:
  – ≥ Three qualified reviewers are assigned (“2 + 1”)
  – Assignments are made by the SRO
  • Based on the scientific content of application
  • Expertise of the reviewer
  • Suggestions from the PI on types of expertise – not names!
  • Suggestions from Program staff
  • Suggestions from SRG members
  • Managing conflicts of interest
  • Balancing workload

Assignments are confidential!
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Scientific Review Groups (SRGs)

• Make recommendations on merit - not funding!
  – Scientific and technical merit
  – Budget and project duration
  – Protection of human subjects, inclusion plans, vertebrate animals, biohazards
  – Resource Sharing Plans
  – Other administrative factors

✓ Impact/priority scores
✓ Criterion scores
✓ Written critiques
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Overall Impact: *Likelihood for the project to exert a sustained, powerful influence on the research field(s) involved*

- **In consideration of:**
  - At least five scored criteria
  - Receive individual, numerical scores
  - Additional criteria in certain announcements
- Additional review criteria
  - As applicable for the project proposed
  - Do not receive individual, numerical scores
  - Additional criteria in certain announcements
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Scored Review Criteria

• Applications for:
  – Research grants
  – Cooperative agreements
• Other criteria apply to other mechanisms

• Significance
• Investigator(s)
• Innovation
• Approach
• Environment

• (FOA-specific criteria)

Scored Review Criteria

Significance

Does the project address an important problem or a critical barrier to progress in the field?

If the aims of the project are achieved, how will scientific knowledge, technical capability, and/or clinical practice be improved?

How will successful completion of the aims change the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field?
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Scored Review Criteria

Investigator(s)

Are the PD/PIs, collaborators, and other researchers well suited to the project?

If Early Stage Investigators or New Investigators, or in the early stages of independent careers, do they have appropriate experience and training?

If established, have they demonstrated an ongoing record of accomplishments that have advanced their field(s)?

If the project is collaborative or multi-PD/PI, do the investigators have complementary and integrated expertise; are their leadership approach, governance and organizational structure appropriate for the project?
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Scored Review Criteria

Innovation

Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions?

Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense?

Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?
Scored Review Criteria

Approach

Are the overall strategy, methodology, and analyses well-reasoned and appropriate to accomplish the specific aims of the project?

Are potential problems, alternative strategies, and benchmarks for success presented?

If the project is in the early stages of development, will the strategy establish feasibility and will particularly risky aspects be managed?
<table>
<thead>
<tr>
<th>Scored Review Criteria</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If the project involves clinical research, are the plans for 1) protection of human subjects from research risks, and 2) inclusion of minorities and members of both sexes/genders, as well as the inclusion of children, justified in terms of the scientific goals and research strategy proposed?</td>
</tr>
</tbody>
</table>
### Scored Review Criteria

**Environment**

Will the scientific environment in which the work will be done contribute to the probability of success?

Are the institutional support, equipment and other physical resources available to the investigators adequate for the project proposed?

Will the project benefit from unique features of the scientific environment, subject populations, or collaborative arrangements?
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Additional Review Criteria

As applicable for the project proposed, reviewers:

- Consider in determining scientific and technical merit
- **Do not** give separate scores for these items.

- FOA-specific criteria
- Protections for Human Subjects
- Inclusion of Women, Minorities, and Children
- Vertebrate Animals
- Resubmission Applications
- Renewal Applications
- Revision Applications
- Biohazards
Additional Review Considerations

• As applicable for the project proposed, reviewers:
  • Address each item
  • *Do not* give scores for these items
  • *Should not* consider them in providing an overall impact/priority score.

• FOA-specific considerations
• Select Agent Research
• Applications from Foreign Organizations
• Resource Sharing Plans
• Budget and Period Support
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NIH Scoring System

• Numerical scores
  – 1.0 (exceptional) to 9.0 (poor)
  – Final impact/priority score - average of individual scores x 10
  – Individual criterion scores
  – Ranked by percentile for certain mechanisms
  – Not Discussed (ND) - streamlining
  – Other designations (NR, DF, AB, NP, etc.)

Final impact/priority scores range from 10 through 90.
NIH Scoring System

• Preliminary scores (before the SRG meeting)
  – Entered by assigned reviewers and discussants in secure website
  – Made available to other SRG members

• Final overall impact/priority scores (at the SRG meeting)
  – Voted by private ballot
  – All eligible SRG members vote

Reviewers are instructed to revise their criterion scores after the meeting.
## Score Descriptors

<table>
<thead>
<tr>
<th>Impact</th>
<th>Score</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Impact</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Exceptional</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Outstanding</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Excellent</td>
</tr>
<tr>
<td><strong>Moderate Impact</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Very Good</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Satisfactory</td>
</tr>
<tr>
<td><strong>Low Impact</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Fair</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Marginal</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Poor</td>
</tr>
</tbody>
</table>
Streamlining

- Allows discussion of more meritorious applications
  - Less meritorious applications tabled at the SRG meeting, designated Not Discussed (ND)
  - Requires full concurrence of the entire SRG
  - Summary statement:
    - Reviewer critiques
    - Individual criterion scores
    - No numerical, overall impact/priority score
Streamlining

• **Score order of review**
  – SRG discusses most meritorious applications first
  – Entire SRG decides when to stop, which applications will not be discussed in panel

• **Other order of review (e.g., IC assignment, mechanism)**
  – SRO prepares a list of average preliminary scores
  – Distributes to SRG
  – Entire SRG decides which applications to discuss
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Pre-Meeting SRG Procedures

• SRO
  – Performs administrative review of applications
  – Recruits reviewers, arranges for meeting date and site
  – Assigns 3 SRG members to each application
  – Makes applications available to reviewers
• Internet Assisted Review (IAR) site or on CDs
• Usually about six weeks before the SRG meeting
  – Instructs reviewers in review procedures
  – Monitors posting of initial scores and critiques in IAR

Documents for Reviewers are available at:
http://grants.nih.gov/grants/peer/reviewer_guidelines.htm#general_guidelines
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Structured Critiques

- **New summary statement format**
  - Bulleted comments from reviewers, less text
  - Criterion scores from assigned reviewers
  - Decreases variability
  - Increases quality of information in critiques
  - More succinct, better organized
  - Encourages evaluative statements
  - Ensures that reviewers address all review criteria and considerations

Critique templates are available at:
The NIH Peer Review Process

Templates for Reviewers

RPG Review Critique Template

1. **Significance**
   - Please limit text to 1/4 page
   - Strengths
   - Weaknesses

2. **Investigator(s)**
   - Please limit text to 1/4 page
   - Strengths
   - Weaknesses

Links to definitions of review criteria
Pre-Meeting SRG Procedures

• Reviewers
  – Examine assignments
  – Submit Conflict of Interest and Confidentiality voucher
  – Read applications, prepare written critiques in templates
  – Enter preliminary scores into IAR
  – Read and consider other critiques and preliminary scores
  – Make travel and hotel arrangements

Preliminary scores and critiques may be due several days or a week in advance!
Post-submission Materials

• Applications submitted for Sept. 25th, 2010 and later:
  – Will only accept administrative materials resulting from unanticipated events, such as
  – Revised budget page(s) (e.g., due to new funding)
  – Biographical sketches (e.g., due to the loss of an investigator)
  – Letters of support or collaboration (e.g., due to the loss of an investigator)
  – News of an article accepted for publication

• Special provisions for training grants and certain FOAs
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SRG Meetings

• Agenda
  – Call to Order - Chairperson
  – Policy and instructions - SRO
  – Discuss applications one at a time
  – Where feasible:
    • In score order
    • Cluster New Investigator (NI) applications
    • Cluster clinical applications
  – Score each application by private ballot after its discussion
  – Discuss other considerations
    • Budget
    • Resource Sharing Plans
SRG Meeting Procedures

- **Discussion format**
  - Members with conflicts excused
  - Initial levels of enthusiasm stated
    (assigned reviewers and discussants)
  - Primary reviewer - explains project, strengths, weaknesses
  - Other assigned reviewers and discussants follow
  - Open discussion (full panel)
  - Levels of enthusiasm (assigned reviewers) re-stated
  - Individual SRG members vote
  - Other review considerations discussed (budget)
SRG Meeting Procedures

• If 60 applications/SRG meeting
  ~ 50% streamlined, 30 applications to discuss and score

• If 9 hour SRG meeting
  ~ ½ hour introduction, streamlining
  ~ 1 hour lunch, 2 x 15 minute breaks

• Leaves
  ~ 14 minutes on average/application
  ~ 3 - 4 minutes/reviewer

Clarity and brevity are essential!
After the Review

- **eRA Commons** ([http://era.nih.gov/commons/index.cfm](http://era.nih.gov/commons/index.cfm))
  - Final Impact/Priority Score available three days after the SRG meeting
  - Summary statement available 4 – 8 weeks after meeting
- Available also to Program Officers at that time
- Confidential document
- Available to:
  - PD/PIs
  - NIH officials
  - Advisory Council members
Summary Statement

• First page
  – NIH Program Officer (upper left corner)
• Name
• Contact information
  – Final Impact/Priority Score or other designation
  – Percentile (if applicable)
  – Codes
• Human subjects
• Vertebrate animals
• Inclusion plans
  – Budget request

A favorable score does not guarantee funding!
Summary Statement - continued

• Subsequent Pages
  – Description (provided by applicant)
  – Resumé and Summary of Discussion (if discussed)
  – Reviewer critiques – essentially unedited
• Follow review criteria for mechanism
• Protections for Human Subjects
• Inclusion Plans
• Vertebrate Animals
• Biohazards
• Budget
  – Administrative Notes
  – Meeting roster