NARAYANA
MEDICAL COLLEGE

An International webinar on "Research Grant Writing"

Conducted by Narayana Translational Research Centre (NTRC)

December 5, 2020 at 10 am to 12 noon.

Panelist

Patron: Dr. Surya Prakasa Rao, Professor and Dean, Narayana Medical College.

Speaker: Dr. Venkatesan Perumal, Research faculty, Biomedical Engineering, New Jersey Institute of Technology (NJIT), New Jersey, USA.

Convenor: Dr. Sivakumar Vijayaraghavalu, Professor and Head, Narayana Translational Research Centre (NTRC).

The webinar was started with the greetings from the Convenor on behalf of Narayana Medical College and honorable Dean Dr. SP Rao to all the participants, followed by a brief speaker introduction.

About the Speaker

Dr. Venkatesan Perumal is currently a research faculty in biomedical engineering, New Jersey Institute of Technology, New Jersey, USA, working on to develop nanomedicines that could address the traumatic blast injury (TBI). Priorly, he did three post-doctoral fellowships pan across USA – his first post – doc was in Oklahoma State University (OSU), Oklahoma, USA, where he worked on hyperthermia triggered liposomal delivery systems and ultrasound image guided docetaxel delivery to address prostate- and colon-cancer. Then, he completed his second post-doc in Texas A & M, University, Texas, USA, where he developed nano-carriers to address pancreatic cancer. His third post-doc was at University of Colorado, Denver, USA, there he developed nano-theranostics to address prostate cancer – an agent that could be used for both diagnostic and therapeutic purpose. His CV is a unique one with *under-graduation in Pharmacy* from *Dr. MGR medical University*, Tamil Nadu, India; *post-graduation Biomedical Engineering* from *Jadavpur University*, West Bengal, India; one of the prestigious public university established in 1905 and ranks 12th in the nation. *Doctorate* from another prestigious

institution – *Indian Institute of Technology (IIT) Kharagpur* (5th rank- India), West Bengal, India, which ranks 5th in the nation.

In a nut-shell – Dr. Venkatesan is highly accomplished academician with degrees from top ranking institutions from our nation and three post-docs from USA; 1. Okhlahoma state University, Okhlama, 2. Texas A & M University, Texas. 3. University of Colorado, Denver, USA and currently Research Faculty in New Jersey Institute of Technology, USA. He has a long career as a researcher and hence we felt he will be an appropriate speaker to deliver the talk on Research Grant writing. Post this speaker introduction, Convenor informed the participants that the Q & A session and the Poll survey are at the end of the presentation.

Dr. Venkatesan started his talk by thanking both the Dean and the Convenor for giving this opportunity to talk on his favorite topic – Research Grant Writing. Then he shared his power point presentation via zoom portal. He stated that grant writing is art of its own, so before beginning to prepare a grant proposal writing one need to consider the rule number one – believe that some wants to give you the money; and it's not going to be easy. The proposal should convince the grant reviewers who are also the experts in the chosen field. Further, he told that three simple steps one need to follow before start writing the grants. All the three are repeats of the same statement – "Read the instructions carefully". He told it thrice to emphasize the significance of reading it. Also he told that one needs to have

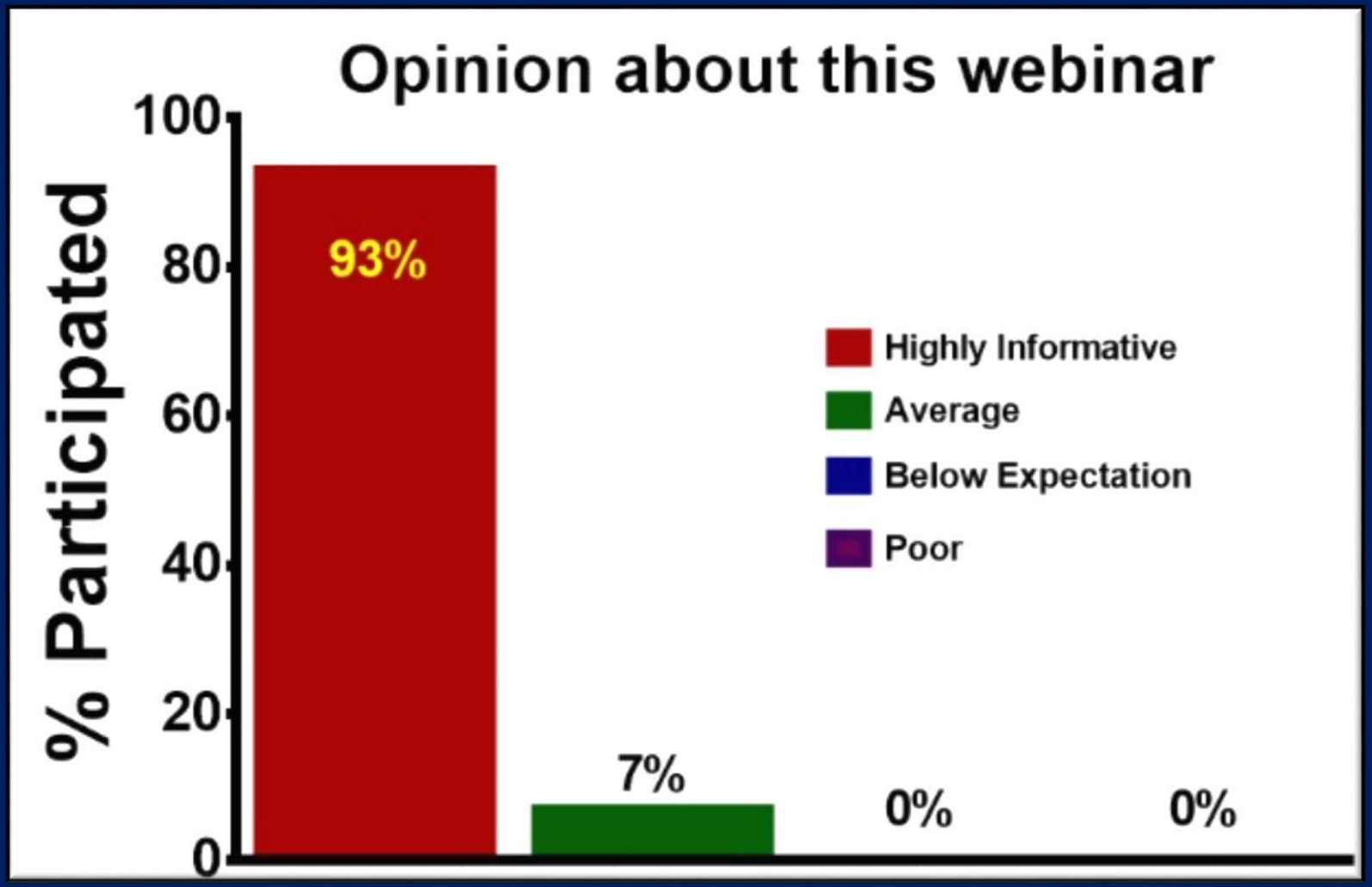
comprehensive plan considering the institution need. For example, if you are part of cancer-nanomedicine program, then you may have to think and write grants that supports the program and not on any other fields of research. He presented the grant pre-submission planning time-line schematically. It had three phases namely, planning, writing and submission. The planning phase should start at-least 8 months before the submission deadline; during that stage well assess your field of interest, resources available to carry-out the project and your expertise in that field. Brain storm your grant idea, call the program officer talk to them take the inputs from them and also call upon your own review committee and determine the animal/human subject's ethical requirements. Second stage - six months prior to the application dead line; start write the out–line and structure the grant carefully spend at-least 4 months of time with that. Finally - two months before submission give the grant for your peers to review and get the feedback from them and edit as needed, ask them to pick-up the gaps in the grant application and try to fill those gaps. Then a month before give it to institutional grant office for their review; so will have adequate time to furnish any missing documents and can be submitted on time. Then he continued to talk about – specific aims and stated it should be hypothesis driven and limited to one page. He further defined and described the hypothesis. He spoke about the research strategy section – this will have three main parts viz. Significance, Innovation and Approach. Then started to talk about 5-page grant proposal – informed that it should have four components – specific aims, background and significance, preliminary data and

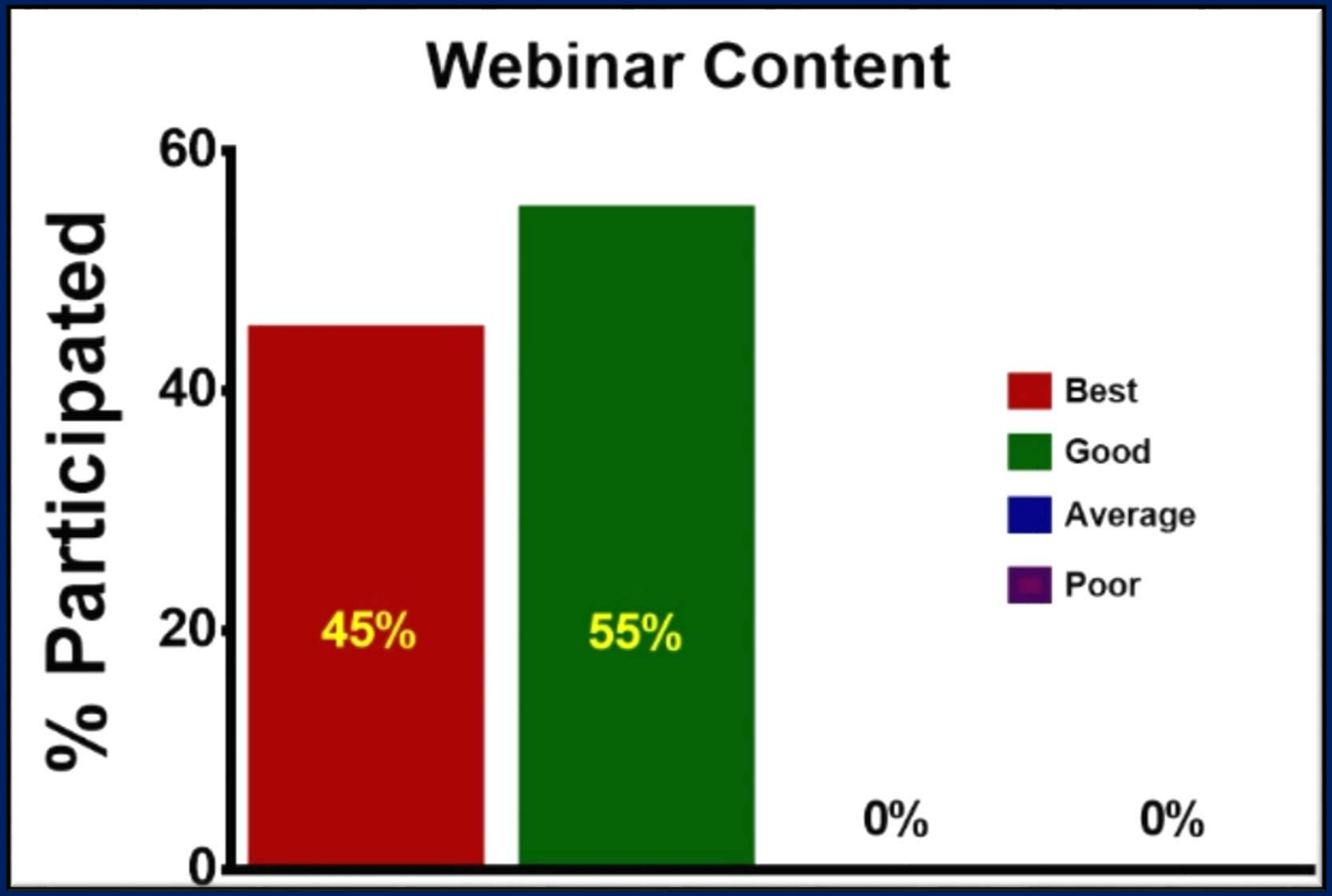
experimental plan and described each section in detail, his power point presentation with all the points he mentioned can be found below. He gave grantsmanship tips and advised the audience to align their grant application with the review criteria to maximize the impact. The overall impact of the idea is majorly considered in funding a grant; significance of the proposed idea to the society, investigator background, innovation, approach will be taken to prove the hypotheses and the institutional support are reviewed. Hence it will be best to construct the grant application from the reviewer point of view. Further, to fill the gaps in your expertise and training and to add critical skills to your team, it is important to collaborate with experts in the field of your interest. He further told that team science is more powerful than an individual applicant. Give a good presentation to the panel of reviewers, handle the stress, anxiety and present the idea comfortably, the reviewers are experts, so any questions or concerns raised answer it sincerely, if you do not know admit it politely and never take it personally. Then he explained about the hall-marks of an outstanding- and weak- application. In addition, he told three rules to be followed while preparing and submitting the grant application; 1. Do not write the grant for yourself; unless it is self – funded; 2. Reviewers are never – wrong/right; 3. List some of the pitfalls in the grant and not all the weakness. Then he enlisted the top 10 reviewer concerns. Prior concluding, he suggested to align the grant idea with the mission of the institute. At-last he acknowledged, our respected dean – Dr. SP Rao, convenor, all the webinar participants including faculty and students of New Jersey Institute of Technology, New Jersey, USA. The Convenor thanked

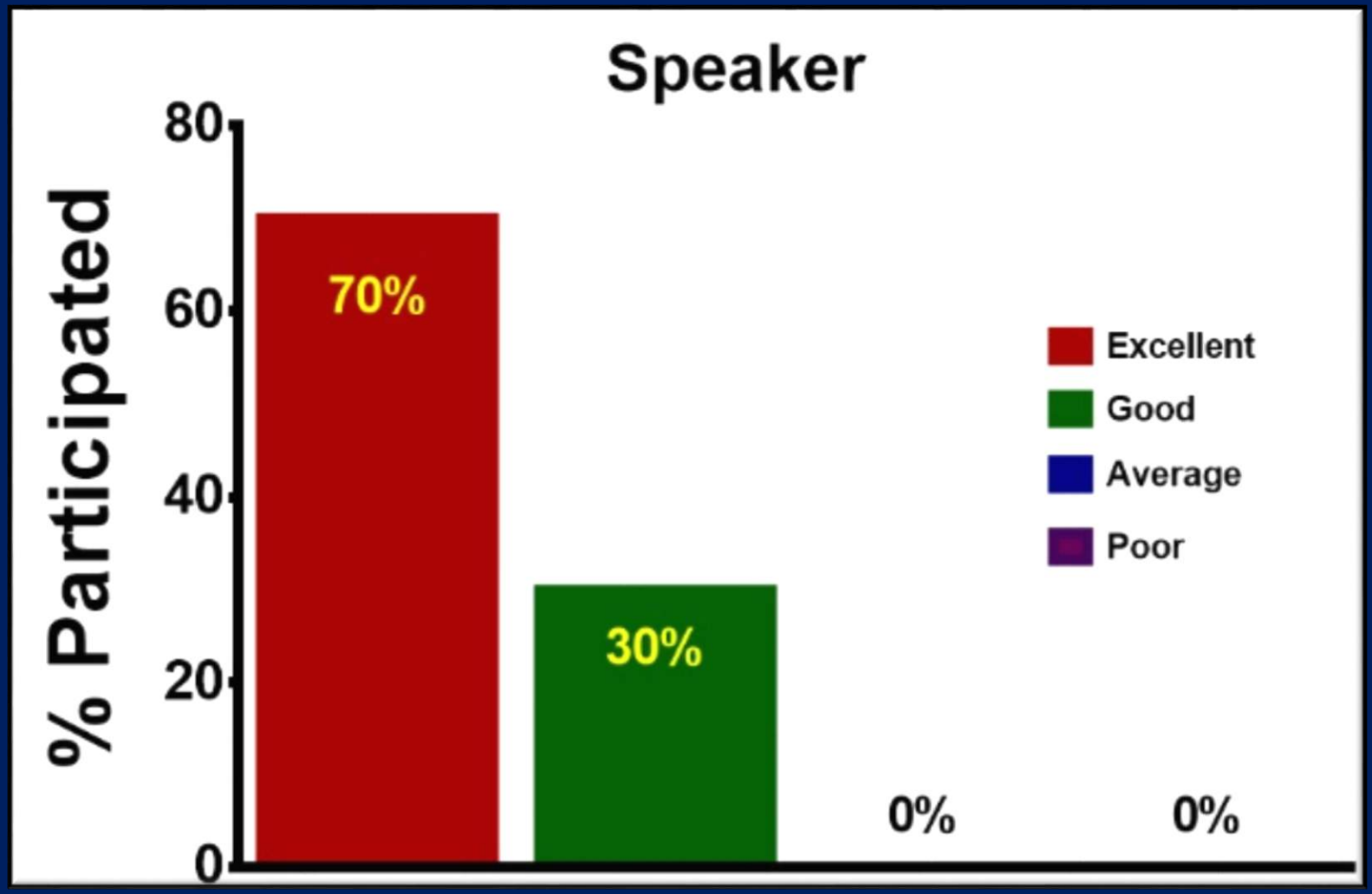
the speaker for the well -structured, comprehensive and high informative presentation on research grant writing.

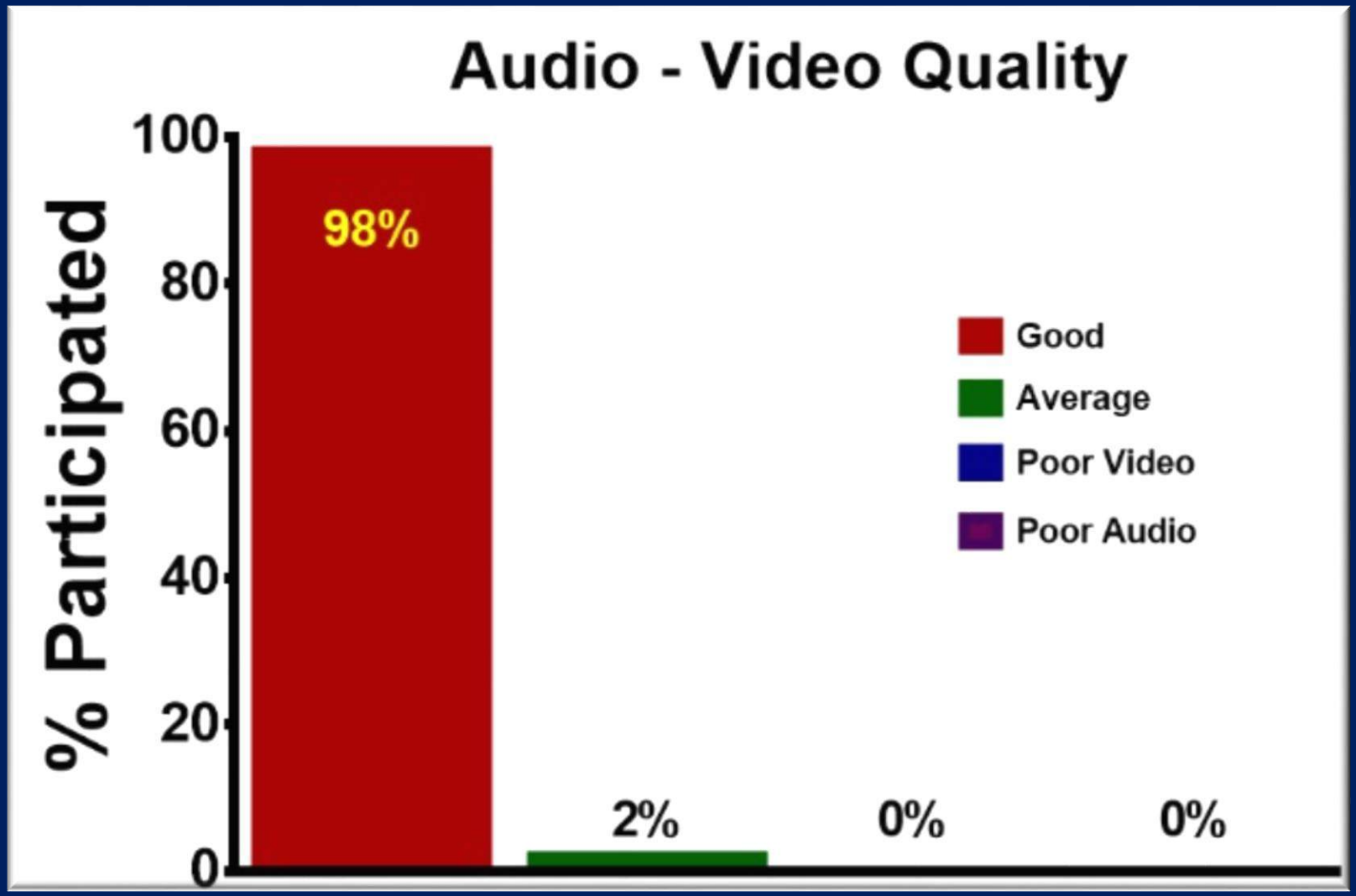
Registrants Profile - Total two hundred and forty-four (244) registrants from India (91%) and other countries (9%) which includes – USA, UK, Saudi Arabia, Nepal, Bahrain, Japan and Malaysia. Indian registrants were from across the country with higher percentage from state of Andhra Pradesh (49%), followed by Tamil Nadu (39%), and Telangana (9%); rest of the 13% are from the following states – Karnataka, New Delhi, Uttar Pradesh and Kerala. Participants poll survey report about the webinar is given below.

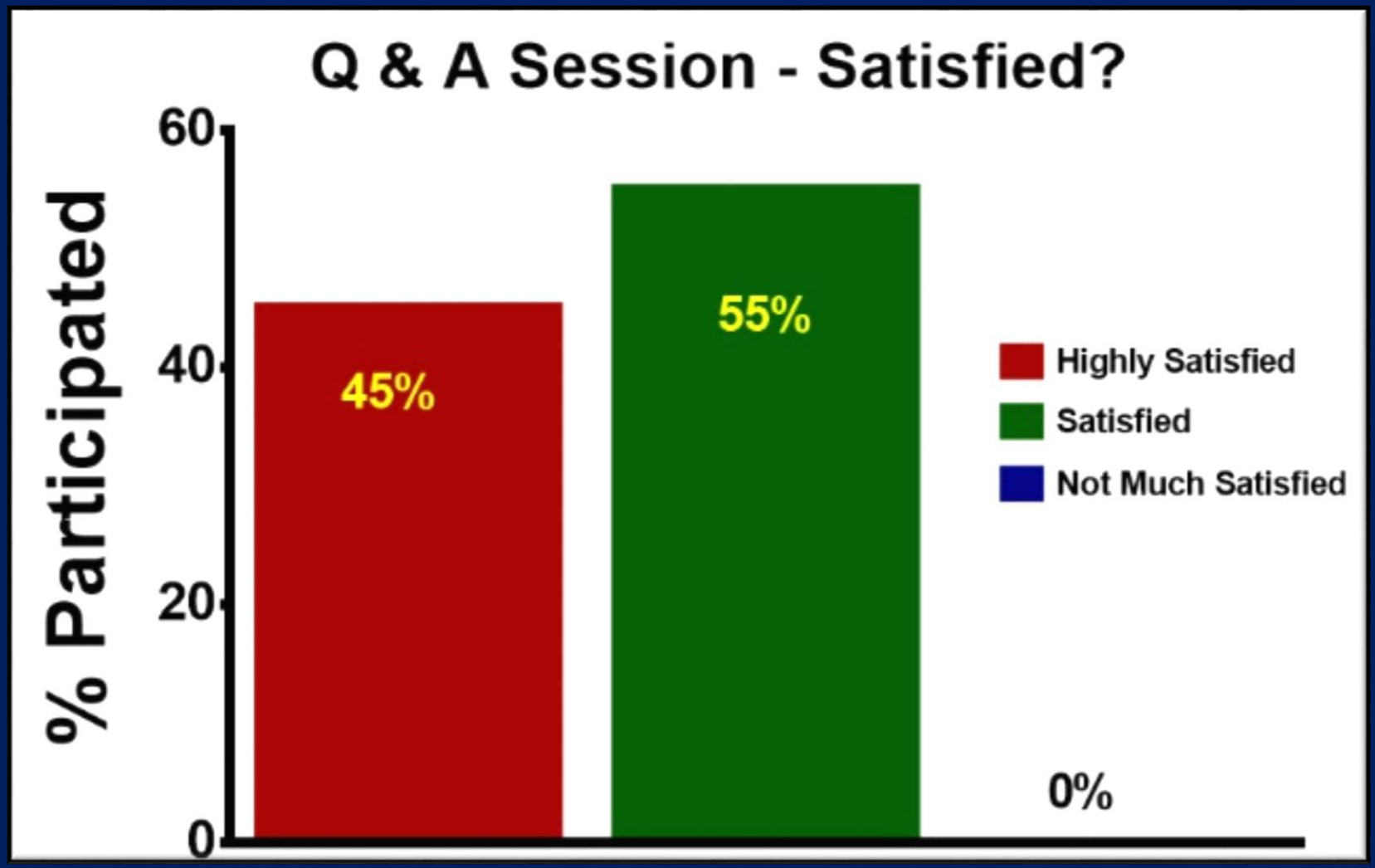
POLL SURVEY REPORT




Webinar Content
% Participated
60
40
20
0
45%
55%
0%
0%
Best
Good
Average
Poor


Speaker
% Participated
80
60
40
20
0
70%
30%
0%
0%
Excellent
Good
Average
Poor


Audio - Video Quality
% Participated
100
80
60
40
20
0
98%
2%
0%
0%
Good
Average
Poor Video
Poor Audio


Q & A Session - Satisfied?
% Participated
60
40
20
0
45%
55%
0%
Highly Satisfied
Satisfied
Not Much Satisfied

Power Point Presentation of the Speaker

Research Grant Writing

Venkatesan Perumal Ph.D.

Research Scientist
New Jersey Institute of Technology

Grants: *Some Basics*

- **Grants** are sums of money awarded to finance particular activities

- It is **important** to understand the **goals of** the funding bodies and their grant programs.

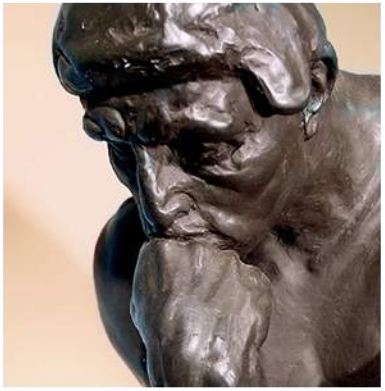
- **Decisions** are made on the applicant's ability to fit the proposed research activities to the interests of the funding body.

START PLANNING YOUR APPLICATION

EARLY

Application Development Strategy

Act (Plan)



Think

Write

Before beginning to prepare a grant proposal, consider the following:

- Rule #1: Believe that someone wants to give you the money.
- Consider the **long-term goals** of your institution.
- Identify yourself and your strengths.
- Create a comprehensive plan - not just a proposal of what you wish to achieve.

3 Simple Steps

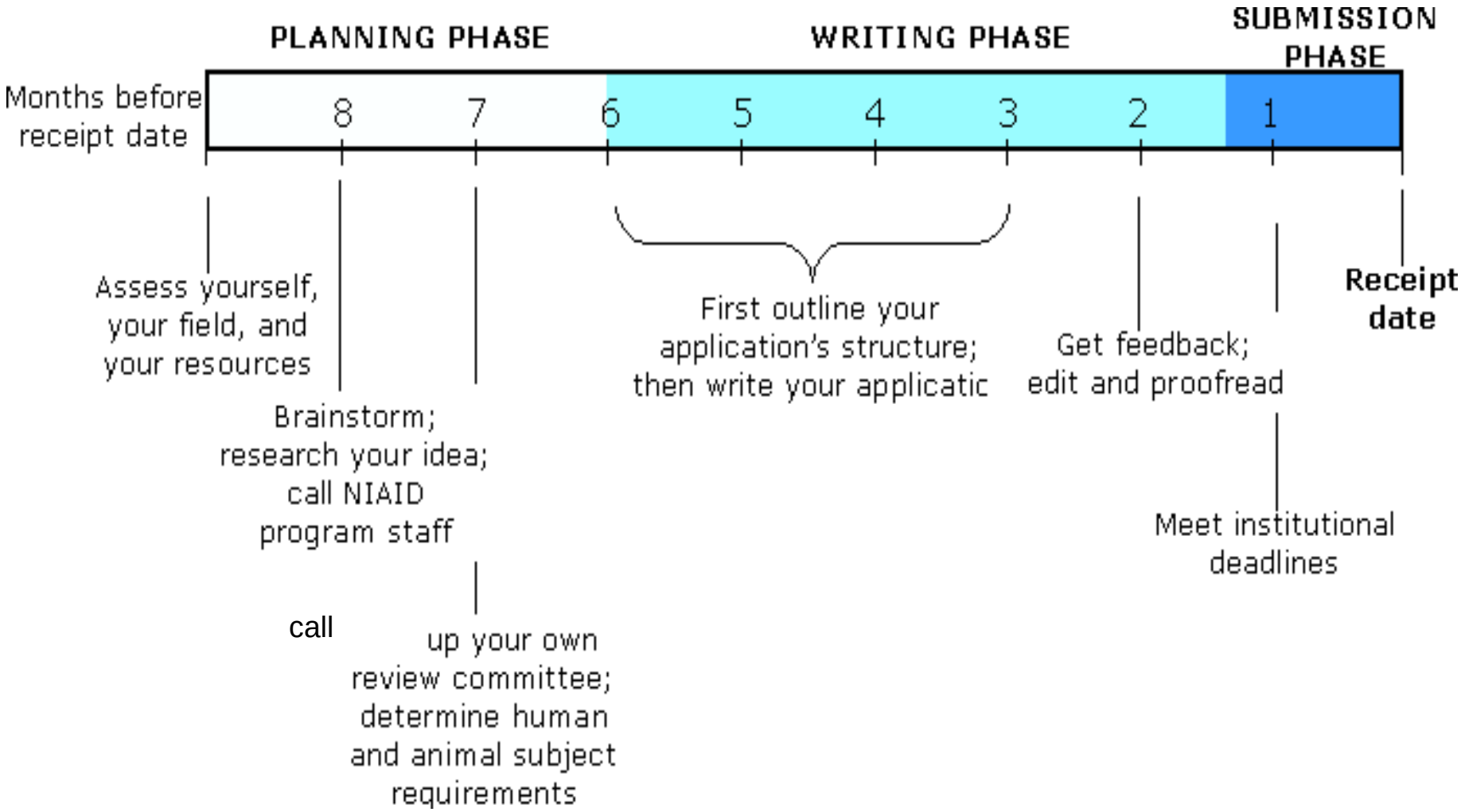
Presentation Matters

3 Simple Steps

- Read the application instructions carefully
- Read the application instructions carefully
- Don't forget …

  … *read the application instructions carefully*

Pre-Submission Planning Timeline



Outline of a Research Proposal

1. SPECIFIC AIMS

It must be hypothesis driven and are limited **to one page.**

2. RESEARCH STRATEGY

Your **12-page Research Strategy** section will have three main parts:

a) Significance
b) Innovation
c) Approach

The four components (for a 5 page grant proposal)

1) Specific aims: 1/2 page to concisely define what you intend to do and why.

2) Background and significance: 1-1/2 page section to review published information in support of your hypothesis. Bring out the importance!

3) Preliminary data: a 1 page section to use in support of your hypothesis, an important part of a grant that allows the reviewers to understand that the approaches you plan to use actually work.

4) The experimental plan: 2 page section that allows the reviewers to understand how you actually plan to attack your question

1. SPECIFIC AIMS

terms like "**aims,**" "**goals,**" **and** "**objectives**" may seem interchangeable they have **separate meanings within your application**.

- **Goals** are strategic and high-level.
- **Objectives** often are a restatement of your hypothesis
- **Aims** are the outlines of your tactics or tasks to be performed.

- Goals are the view from 30,000 feet
- Objectives are the view from 10,000 feet
- Specific Aims are the view from 1,000 feet

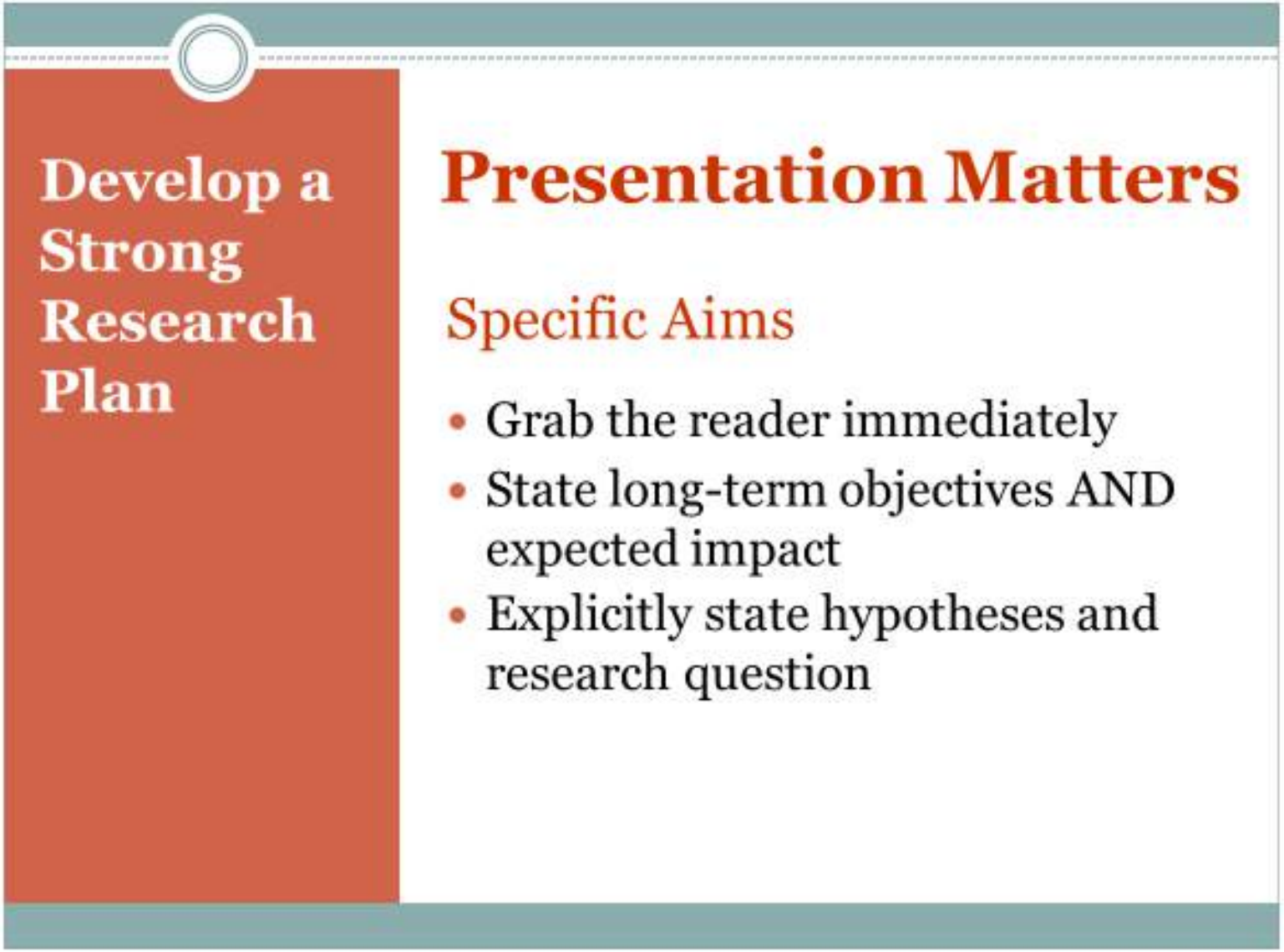
1. SPECIFIC AIMS

Specific Aims **should cover the following**:

- Broad, long-term goals;
- Specific objectives and hypotheses to be tested;
- Expected outcomes; and
- Impact on the research field.

Most successful applications **have two to four Specific Aims**

1. SPECIFIC AIMS



1. SPECIFIC AIMS

STRATEGY:

If the aims follow each other so that Aim 2 follows Aim 1 and Aim 3 follows Aim 2, you must tell the reviewers what you intend to do if you get an unexpected result with Aim 1.

TIP:

Three to four aims support enough hypothesis-testing strategies and description within the application and better support the number of researchers under the budget and likely four-year project duration.

1. SPECIFIC AIMS

HYPOTHESIS

Definition: a proposed explanation for a phenomenon

NOT: Xist is interesting: let's study it.

BUT: Xist regulates X chromosome inactivation by binding to the X chromosome to be inactivated

Be specific and focused

Do not just use a technique to address an experimental area without a well formulated hypothesis (no fishing trips)

OUTLINE OF SPECIFIC AIMS

You might consider using a **standard format for** each of your aims using separate sections.

• **Rationale —** This provides **the strategic context**, meaning what you are trying to show and why.

• **Experimental Approach** — Here, **detail how the experiments** will be performed.

New investigators either must show preliminary data demonstrating such familiarity or recruit collaborators with widely-acknowledged expertise in the method.

• **Outcomes and Alternatives** — Use this section to describe your experiments' **potential results and their implications** for your proposed model(s).

2. RESEARCH STRATEGY

you break up the 12 pages as follows:

- Significance — 10-15 percent (1-2 pages)
- Innovation — 15-20 percent (2-2½ pages)
- Approach — 33-50 percent (4-6 pages)
- Preliminary Data/Progress Report — 25 percent (3 pages)

2. RESEARCH STRATEGY

(a) Significance

- Explain the **importance of the problem or critical barrier** to progress in the field that the proposed project addresses.

- Explain **how the proposed project will improve** scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.

- Describe **how the concepts, methods, technologies, treatments**, services, or preventative interventions that drive this field **will be changed if the proposed aims are achieved.**

2. RESEARCH STRATEGY

(a) Significance

- Many investigators are unsure regarding the difference between **"significance" and "impact."**

- NIH states that "**significance**" is how important your research would be **if everything worked perfectly**, and

- **"impact" is** the **likelihood t**hat the project, as written, will change the relevant scientific field and make a difference in human health.

REMEMBER:

Your research can-not have impact if it is not worth doing, so high scores for both Significance and Impact are important indicators for funding.

2. RESEARCH STRATEGY

(a) Significance

TIP:

If your research will not affect a large group of people, you can make a "translation" argument — meaning your results could lead to additional developments.

STRATEGY:

One tactic is to complete your Approach section before tackling the Significance because you will have a clearer overall perspective of your proposal.

2. RESEARCH STRATEGY

b) Innovation

• Explain **how the application challenges** and seeks to shift **current research or clinical practice paradigms.**

• Describe any **novel theoretical concepts, approaches or methodologies, instrumentation or interventions** to be developed or used, and any advantage **over existing** methodologies, instrumentation, or interventions.

•

2. RESEARCH STRATEGY

b) Innovation

- **Explain any refinements, improvements, or new applications** of theoretical concepts, approaches or methodologies, instrumentation, or interventions

STRATEGY:

Describe the endpoint of your experiments, if they work as planned, and then explain what is new and novel about the information you will have at the end of your project.

2. RESEARCH STRATEGY

(c) *Approach*

• **Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims** of the project. Also include **how the data will be collected, analyzed, and interpreted** as well as any resource sharing plans as appropriate.

• **Discuss potential problems, alternative strategies**, and benchmarks for success anticipated to achieve the aims.

REMEMBER:

Reviewers will be especially careful to scrutinize the Approach for potential problems, alternative strategies and benchmarks for success.

2. RESEARCH STRATEGY

(c) *Approach*

• If the project is in the early stages of development, describe any strategy to establish feasibility, and **address the management of any high risk aspects of the proposed work**.

• **Point out any procedures, situations, or materials that may be hazardous to personnel** and precautions to be exercised.

TIP:

Anticipating critiques during your proposal writing is one of the best defenses you have, and knowing that the Approach score provides the strongest correlation to your Overall Impact score shows that this section is where you should devote most of grant preparation time.

Outline for your experimental approach as follows

1) Restate **each specific aim** at the beginning of each section

2) **Restate the hypothesis** for the specific aim

3) Provide a **rationale for the specific aim**

4) Provide a detailed "**plan" for the experiments**

5) What are **the expected outcomes**?

6) Be sure to **include alternate plans** if the selected approach fails.

PRELIMINARY DATA

Develop a Strong Research Plan

Presentation Matters

Preliminary Studies/Progress Report

- How previous work -- by you, your team, and others -- leads to this study
- Demonstrate your experience, competence and likelihood of continued success
- Must flow logically from literature review and major themes of the problem area

PRELIMINARY DATA

Not always possible to have preliminary data, but it helps a lot!

Examples:

Show that the **technique has worked for a related project**

Data that **show that the hypothesis is sound**

Develop a Strong Research Plan

Presentation Matters

Common Miscues:

Failure to ...

- Document why the problem is important
- Distinguish empirical findings from speculation
- Critically analyze key themes in literature
- Consider alternative perspectives
- Read, understand, and cite the crucial studies

Grantsmanship Tips

Align your application with the review criteria to maximize impact:

- Significance
- **Investigator**
- Innovation
- Approach
- **Environment**

Align with Review Criteria

1. **Overall Impact**
2. **5 Core Review Criteria:**
   - Significance
   - Investigator
   - Innovation
   - Approach
   - Environment

Final Priority Score

OVERALL IMPACT

The likelihood for the project to exert a sustained, powerful influence on the research field(s) involved:

- in consideration of the following five core review criteria, and
- additional review criteria (as applicable for the project proposed)

Address this on your Specific Aims page!

Align with Review Criteria

Scored Criteria	Application
Significance	Research Strategy a. Significance
Investigator(s)	Biosketch - Personal Statement Letters of Support
Innovation	Research Strategy b. Innovation
Approach	Research Strategy c. Approach
Environment	Facilities & Other Resources

Core Review Criterion #1

SIGNIFICANCE

- Does this study address an important problem?
- If the aims are achieved, how will scientific knowledge be advanced?
- What will be the effect on concepts or methods that drive this field?

Core Review Criterion #2

INVESTIGATOR

- Are the **investigators appropriately trained** and well suited to carry out this work?
- Is the **work proposed appropriate to the experience level of the principal investigator** and other researchers?
- Does the investigative team bring complementary and integrated expertise to the project (if applicable)?

Core Review Criterion #3

INNOVATION

- Does the **project employ novel concepts, approaches or methods?**
- Are the **aims original and innovative**?
- Does the project challenge existing paradigms or develop new methodologies or technologies?

Core Review Criterion #4

APPROACH

- Are the conceptual framework, design, methods, and analyses adequately developed, well-integrated, and **appropriate to the aims of the project**?
- Does the applicant acknowledge potential problem areas and consider alternatives?

Core Review Criterion #5

ENVIRONMENT

- Does the **scientific environment in which the** work will be done contribute to the probability of success?
- Do the proposed experiments take advantage of unique features of the scientific environment or **employ useful collaborative arrangements?**
- Is there **evidence of institutional support**?

Other Review Considerations

- Human subjects
- Animal care and use
- Select agents
- Model organism sharing plan
- Data sharing plan

The FOA will list the review criteria and any additional issues that reviewers will be asked to evaluate.

Grantsmanship Tips

IDENTIFY COLLABORATORS

- Collaborate with other investigators
  - Fill gaps in your expertise and training
  - Add critical skills to your team

- "Team Science" can be powerful

Multiple Principal Investigators

- Single PI model does not always work well for multi-disciplinary, collaborative research
- Recognizes contributions of full team

Grantsmanship Tips

GET FEEDBACK

Show your draft application to a colleague

Show your draft application to a colleague… who does not already know what you intend to do

Show your draft application to a colleague… who is not your best friend

Grantsmanship Tips

Your draft reviewers need to understand

- What you intend to do
- Why you believe it is important to do
- Exactly how you are going to do it

If they don't get it, you must revise your application.

Leave enough time for revisions

Grantsmanship Tips

PROVIDE A GOOD PRESENTATION

TO ACHIEVE A GOOD REVIEW

Personnel

- Explain the staffing requirements in detail and ensure that this make sense.
- It is essential to provide brief details of the relevant qualifications and experience of the staff.
- To minimise expenses, the plan should include the phasing out of staff whenever their tasks are completed.

Budget

- The application should include an itemised budget setting out the costs year by year.
- A cost justification for each item should be given.
- The budget should be exhaustive.
- If additional funding from other sources is sought then this should be made clear.

Budget

- Use the budget to show how the grant fits into a larger plan.
- Most grant forms offer very few categories for expenses.

  - *Examples:*

  ✓ Personnel / Fringe

  ✓ Travel

  ✓ Equipment

  ✓ Supplies

  ✓ Operational

Budget Tips

- Don’t be tight!
- Do your research on costs.
- Pay attention to limits and allowable expenses.
- Be clear with in-kind and matching funds.

Hallmarks of an Outstanding Grant Application

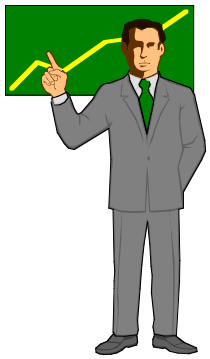
- Strong significance to an important problem in public health: IMPACT is high
- High degree of novelty and innovation
- Strong track record by a well qualified applicant
- Clear rationale
- Relevant and supportive preliminary data
- Clear and focused approach that provides unambiguous results
- Careful attention to details
  - Spelling, punctuation, grammar, fonts, clarity of data, error bars, spelling, etc

Common Reasons Cited for a Weak Application

- Lack of or weak impact
- Significance not obvious or weak
- Too ambitious, lacking focus
- Unclear or flawed hypothesis or rationale
- Applicant track record weak or lacking appropriate expertise
- Feasibility unsupported
- Approach flawed
- Poor writing

Three Simple Rules to remember when planning, writing and submitting your application

#1



DO NOT write the application for yourself
Unless you are going to fund it yourself

You MUST convince
the entire review committee
and the funding agency the proposed research will be of high impact and feasible

#2

Reviewers are never wrong, Reviewers are never right:

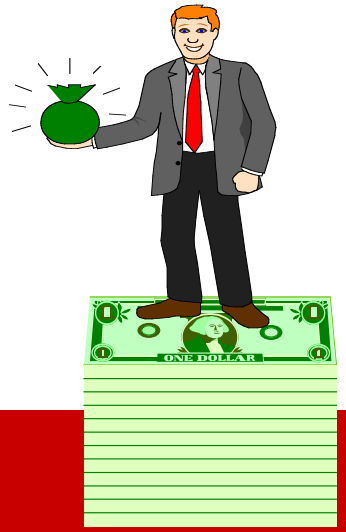
they simply provide an assessment of material that you provided in your application

Don’t Take the Criticism Personally!

#3

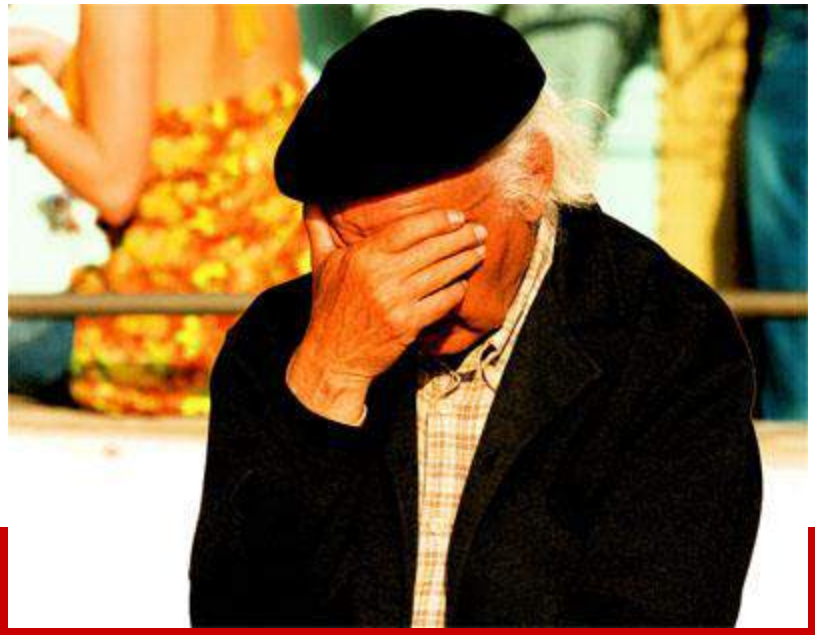
If you are revising the application the comments in the summary statement only list some of the weaknesses …. not all of the weaknesses.

When you revise your application use the time as an opportunity to improve the entire application.



Top 10 Common Reviewer Concerns

…..or How Not To Get DINGED!



1

There is not a CLEAR HYPOTHESIS, or WELL DEFINED GOALS

- Provide a focused hypothesis, objectives
- Describe the importance and relevance of your problem
- Be clear on how your project will move the field forward

2

The specific aims do NOT TEST the Hypothesis, or the specific aims DEPEND on results from previous aims

- The best proposals are those with independent specific aims that address your hypothesis using different approaches

3

The proposal is NOT MECHANISTIC, or NOT SCIENTIFICALLY RELEVANT

- Do not propose correlative studies, propose strong associations
- Do not propose general observations, propose specific manipulations

4

This application is not APPROPRIATE for the GRANT MECHANISM

5

The proposal is OVERLY AMBITIOUS

- Set realistic goals for the budget and project period you propose

6

PRELIMINARY DATA is lacking

- Include preliminary data for all aims
- Use preliminary data to show knowledge of methods and data analyses
- But DO propose more than just confirming preliminary results

7

I’m not sure that the Investigator can do the PROPOSED EXPERIMENTS

- Don’t propose what you can’t do
- Include Collaborators and Consultants on your project
- Describe the value of datasets and experimental models

8

The background section is MISSING KEY publications and experimental findings

- Thoroughly describe the literature, especially controversies, *but….*
  - Support your views and ideas
  - Be sure you have found key references

9

Experimental details, alternative approaches, or interpretation of data are INADEQUATELY DESCRIBED

- Don’t assume the reviewers know the methods
- Provide other experimental directions you might use should you encounter problems
- Show the reviewers that you have thought about your research plan

10

The Proposal is NOT RELEVANT to the MISSION of the Institute

- Make your application FIT the Mission of a particular Institute
- Don’t FORCE your application on an Inappropriate Institute

Acknowledgements

Thanks To

- **Dr. Surya Prakasa Rao, MD**

Professor and Dean, Narayana Medical College,

- **Dr. Sivakumar Vijayaraghavalu, Ph.D**.

Professor and Head

Narayana Translational Research Centre

- **ALL participants**

And

- **Faculty and students**

of New Jersey Institute of Technology

Good luck with your research proposals!

Thank you

Questions?