Tips and tricks on how to prepare a competitive S10 submission

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Objectives for this Symposium

- The NIH S10 shared instrumentation grant is a fundamental source of equipment funding for research cores.
- S10 grant writing is challenging: the format is complex and applications require integration of contributions from many colleagues.
- The preparation of the proposal is completely different to a standard R- U- or P- submission and requires a different way of thinking about grant preparation as you are serving a group of investigators and solving a collective problem by solving a technical limitation by providing a piece of much needed instrumentation.
- This first presentation will provide an overview of the mechanism and various do's and don'ts that may help you prepare a strong application.
- The subsequent talks are vignettes on how to address specific and nuanced components unique to the S10 mechanism

Co-presenters in this session

- These vignettes are highly specific and presented by very experienced investigators who have been successful in attracting funding for institutional facilities through the S10 mechanism.
- The presenters are:
  - Birgit Schilling from Buck Institute who will discuss the importance of preliminary data for a successful application
  - Neela Yennawar from Penn State who will untangle the complexities of calculating and reporting accessible user time (AUT)
  - Pablo Ariel from UNC who will discuss how to best present a research summary
  - Joseph Dragavon from UC Boulder who will discuss the importance of Need in the application
  - Yoav Altman from Sanford Burnham who will address issues of system management

NIH S10 instrumentation grant program

- Administered by the Office of Research Infrastructure Programs (ORIP)
- Only one submission date a year, generally in early June
- There are three funding levels/opportunities:
  - Basic Instrumentation Grant Program (BIG)
    - $25,000 -$350,000
    - This program is limited to institutions that have not received S10 instrumentation funding of $500,001 or greater in the last three fiscal years
  - Shared Instrumentation Grant Program (SIG)
    - $50,000 -$750,000
    - This is the most commonly used mechanism
  - High-End Instrumentation Grant Program (HEI)
    - $750,001-$2,000,000
- More information and FAQ:

https://orip.nih.gov/construction-and-instruments/s10-instrumentation-programs

These are SHARED instrumentation grants

- What's eligible?
- Shared!!!! Instruments
  - Several NIH-funded users
    - 3 minimum
    - The upper limit is soft particularly with institutional facilities. However, the description of the science has a page limit, so generally 8-10 research projects is a reasonable upper limit.
  - Cannot be a sneaky way of getting funding for a senior investigator and his/her buddies
    - The panel sees right through this type of application
  - The Science that the instrument will be used for is not being evaluated as the underlying grants have already been funded, however, the appropriateness of the requested device (and accessories) for the proposed use is in question. Know what you are talking about!

Important components

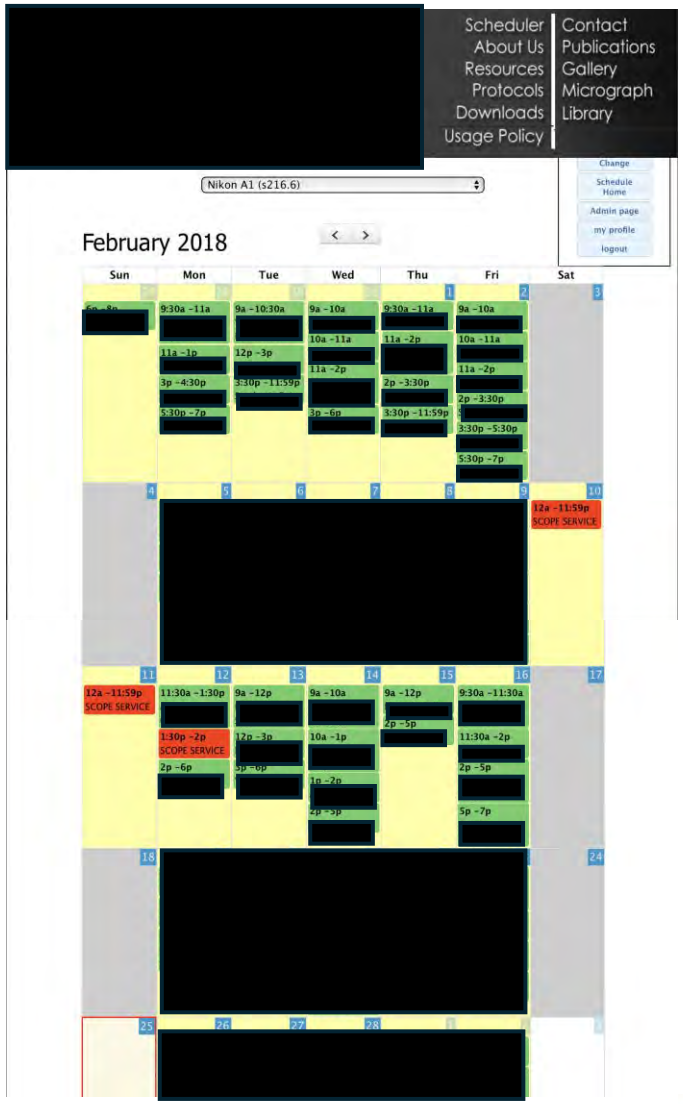
- **Do the applicants need what they are asking for?**
- Do the applicants have sufficient technical expertise?
  - Both to use the instrument effectively AND analyze the data that will be produced.
- Have they made a good choice?
- Will the instrument solve the problems being studied?
- Is the organizational/management plan good?
- Are plans in place for data management (access/storage/back-up)?
- Is the training plan well organized?
- Is the cost recovery viable and compliant with NIH guidelines?
- Is the institutional support sufficient to pay costs if there is a shortfall?
- These issues are all critical and finessed and importantly dealt with specifically by my colleagues in the subsequent presentations.

The Study Section Roster:

- Generally pulled from awardees and cognoscenti (including several people at this meeting!)
  - This means
    - Senior Faculty
    - Center Managers
    - Instrument Builders
    - Instrument Users
- What this really means is that the panel truly know what they are talking about and applicants really need to know their stuff!!!

First Triage Point: Need

- **Need, need need…** This is the first and most critical scorable criterion.
- This is so important we have a whole presentation on it presented by Dr. Dragavon later in this symposium. Accordingly I will keep comments brief to minimize redundancy.
- There is a big difference between “want” and “need”. If you do not really need the system its probably going to be difficult to justify the request.
- You do not need to be asking for something cutting edge.
- As long as you can justify need:
  - Massively overused current devices
  - For example, this system is used more than 3000 hours/year



Can I use this mechanism to replace old machines?

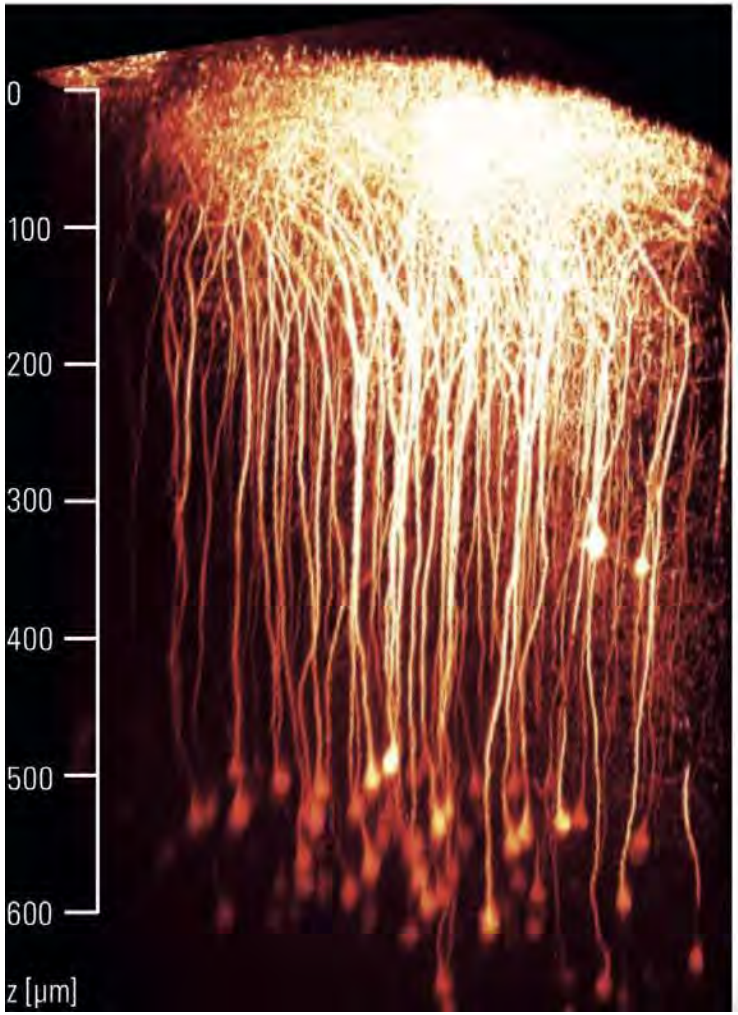
- Yes!
- So, how to justify this?
  - The best route is to get a letter from the manufacturer that categorically states that the instrument has reached end of life and can no longer be supported.
  - Remember that the panel will know what models are old and what is due for a replacement (they are experts).
  - If you complain that you need to replace a newer device because it is no longer working/working poorly, this really may just reflect a lack of maintenance and care for the device you have….. Not a good sign ☺

Second Triage point: Knowledge

- The panel is very knowledgeable… you need to know your stuff.
  - This comes out in the instrument comparison section
  - Opinion (why you prefer brand X over Y) is ok, but make sure it is supported by knowledge, not hearsay

Knowledge is essential, this Means:

- Do not recite verbiage from brochures… for example…



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Things not to put in your grant application

- This is from my experience, as a microscopist: but really speaks to a limited knowledge base
- “We really need multiphoton microscopy because of its improved resolution over single photon confocal”
- “STED is very easy to implement with most available fluorophores and mountants”
- “Live cell STORM can be done readily with a “xxxx””
- Remember the Panel know their stuff….

Preliminary data

- This is not required, as defined in the program announcement from the NIH.
- In fact, the issue of a need for preliminary data in the application was a source of much discussion in the group as we prepared for this panel.
- HOWEVER "If an instrument can be demoed, including preliminary data is an effective way of showing advantages of the novel technology compared to what's currently available to the PI and the users." (NIH S10 program FAQ)
- Don't forget the science has already been judged, the point here is:
  - Does the group need it for the proposed science?
  - Can they use it expertly?
  - Does it actually solve the problem?
  - All preliminary data are good, even showing that a confocal helps over widefield… but for some justifications, it is essential….
- Most importantly only show really good powerful preliminary data that makes a solid and clear point.

Preliminary data is more important when pushing technical and methodologic barriers

- For example a few years ago we submitted a successful application for a 3 axis STED system.
- We included clear preliminary data for all 8 projects
- At this time STED was a new approach and we had to really prove its value.
- By the way this system is still producing exceptional data.

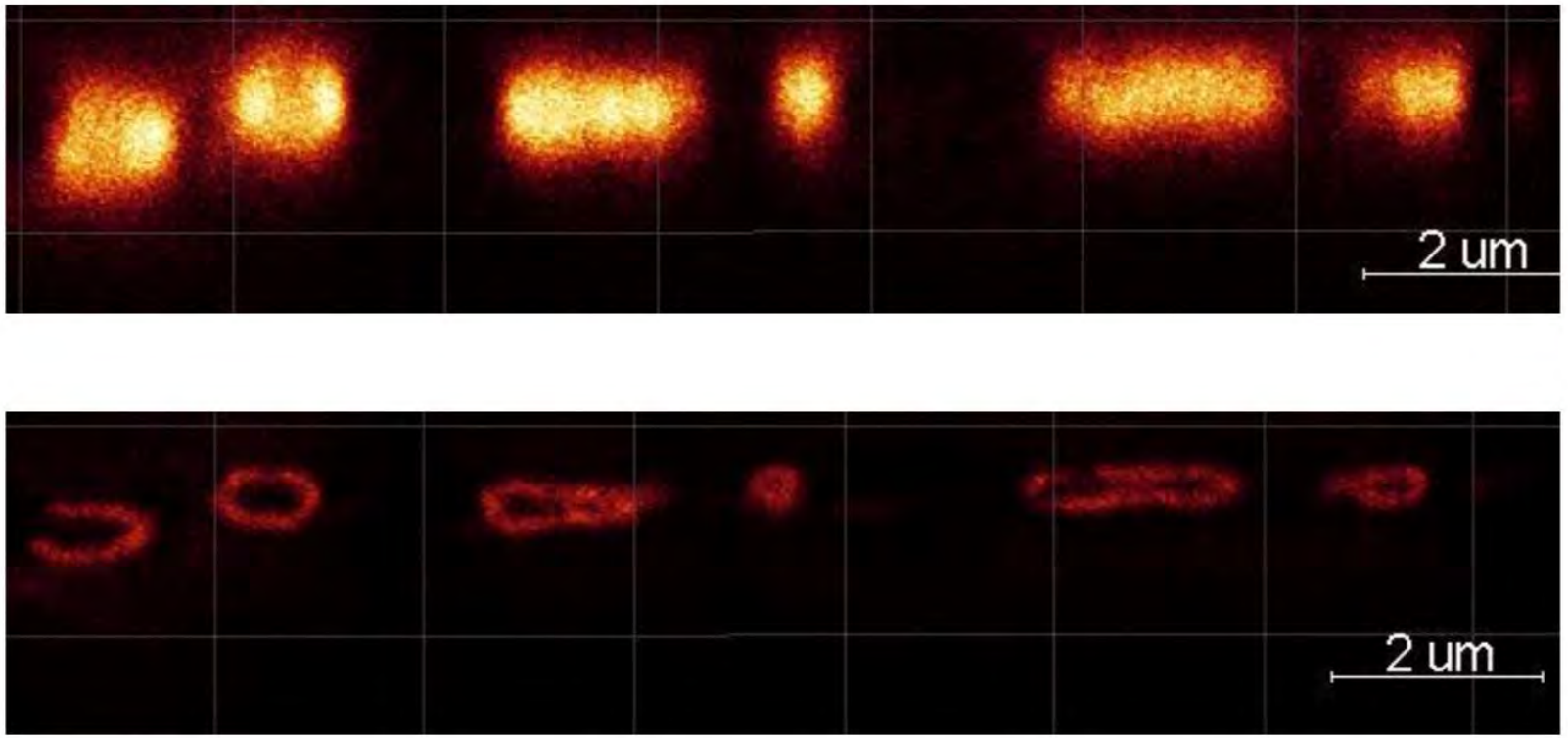


Figure 2: Comparison of Confocal versus STED imaging of TOM20 staining for outer mitochondrial membrane illustrating that the discrimination of sub organelle compartments are achievable using STED methodology.

Research Projects and Management plan

- These topics and their minutiae will be discussed at length by Dr's. Ariel and Altman later in this symposium
  - Most importantly we have chosen to focus two presentations specifically on these topics to highlight the importance of their content
  - Do not shortchange these facets of the proposal as they give the reviewers and ORIP a real awareness of sagacity, organization and professionalism.
  - I did want to add a couple of notes on the management plan here which may not be covered by Dr. Altman.
    - Do not short change this section, this is where it becomes clear whether the device is really being installed and managed in a by a truly "shared facility".
    - Commonly, this trips up the "not-really-a-shared instrument" submission. For example a device which is just for a single user who has not really thought about sharing it with others.

Institutional support

- Does not have to supply part of the cost of the instrument unless you are exceeding the cap
- Details of financial support mentioned in the proposal should match commitments described in the institutional letter of support, and describe support committed to the instrument, not the core in which it is installed.
- The letter must confirm that “the institution will commit to provide backup for the financial plan for five years from the installation date of the instrument or for its effective lifetime.”

microscope request. This device is an essential and important expansion of the intra-vital imaging efforts within CBI and the medical school. I want to make my support for the application quite clear. Accordingly, I will ensure that the new multiphoton facility that Simon proposes in the application is put into place and, perhaps more importantly, in case of a shortfall of funds to maintain the instrument I will make sure that all service costs, etc., are paid. This is a very important addition to a very important facility.

Other concerns #1

- Does the instrument eliminate bottle necks, and improve workflow and capabilities?
  - Can you show how it will eliminate bottle necks?
  - What features improve workflow?
  - Is the need for the improved capabilities demonstrated in the description of the supported research projects?
  - NEED NEED NEED

Other concerns #2

- Do not ever ask for more than you need or can justify, ever ever ever
  - Try not to design the system by committee
  - Do not package multiple instruments into one request
- Make sure the manufacturers quote (essential) is realistic and not inflated
  - Don’t forget that the panel might see many requests for the same device. If your quote has tons of extras you should justify why.
- Do not request service contract costs

Other concerns #3

- Who should be PI/PD?
  - The PI/PD does not need to be a major user or have an NIH-funded grant.
  - Core Directors can be PI/PD if they have significant expertise related to use of the instrument and will play a leadership role in its implementation and management.
  - However, if you choose to be PI/PD and are new to writing NIH grants, make sure to enlist an experienced faculty or administrative mentor to help with planning and grantsmanship.

Other concerns #4

What is Accessible Usage Time (AUT) and how do I calculate it?

- AUT = “The number of annual hours the instrument can be practically used for biomedical research”

- As was the case for research summaries, management and justification of need this is very very important and we have a specific presentation on its minutiae by Dr. Yennawar later in this symposium

Practical Suggestions

Organize your application neatly, and exactly as outlined in the PAR, using the suggested headings so that the reviewers can easily find the information they are looking for.

This is discussed in more depth by Dr. Ariel later today

Make sure to read the “Scored Review Criteria” in *Section V. Application Review Information* of the PAR. This describes the elements that the reviewers are looking for.

One more thing

- This is a 1 year grant but
  - with a 5 year reporting period, each year the PI will need to send in report on use that year.
  - Be ready to report on activity, maintenance, use and activity every year after close out for 5 years.
  - **Most importantly**, and probably the hardest to implement…… users should cite the grant number when they publish papers
  - We post signs on all the doors to the core imaging suite with grant numbers, but you do need to stay on top of this

Finally: Remember

- There is only one submission a year so it is SSSSSLLLLOOOOOWWWWWW
- There is only one review panel each year so do your best.
- The review panel is full of scientists who
  - Know exactly what you want
  - Live in the same world
  - Have written successful grants
  - Can be cynical!

Questions ?