RESEARCH PLAN

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PAGE LIMITS AND OTHER INSTRUCTION

- **Read the FOA for instructions.**

- **There is often a page limitation:**
  - **6 pages for NIH R03 grants**
  - **12 pages for NIH R01 grants**
  - **25 pages for NIH R25 grants**

- **Review the instructions. Typically:**
  - **At least 0.5-inch margin**
  - **Font of 11 or larger**

CHARACTERISTICS OF A GOOD RESEARCH PLAN

- Innovative
- Important topic, likely to be impactful
- Feasible
- Solid methodology
- Responsive to the subject of the FOA
- Responsive to the review criteria
- Well-written, with a good flow

INNOVATION

- **Requires a great knowledge of the field and strong literature review.**

- **Could the proposed research potentially lead to:**
  - **A more effective treatment for a certain cancer?**
  - **A less expensive way to diagnose a disease?**
  - **A less invasive way to diagnose a cancer?**
  - **A more efficient way to do some calculations?**
  - **A method to engage URM students in research?**
  - **An approach to quitting smoking that is more acceptable to the society?**
  - **Prove (or reject) something more conclusively?**

- **In short, what is new?**

INNOVATION

- **Set the stage, by reviewing "salient and relevant" parts of the literature**

- **Identify at least one gap (preferably an important one)**

- **Make a case as to why your study will address that gap and advance science**

INNOVATION: EXAMPLE 1

- **Set the stage, by reviewing "salient and relevant" parts of the literature**
  - **Raw opium is used by 5 million across the world. Some previous retrospective studies have shown that opium may cause cancer.**

- **Identify at least one gap (preferably an important one)**
  - **But there are no prospective studies that have investigated the effect of opium in causing cancer.**

- **Make a case as to why your study will address that gap and advance science.**
  - **We have data from a prospective study of over 50,000 people, of whom 8,500 use opium. We can use the data to study whether opium causes cancer.**

INNOVATION: EXAMPLE 2

- **Set the stage, by reviewing "salient and relevant" parts of the literature**
  - The nation needs to be competitive. Fairness and equity matters. Certain racial groups are underrepresented in science (URM groups), which makes the nation less competitive. It also matters for fairness and equity purposes. XX, YY, and ZZ methods have been previously tried, yet we have gaps.

- **Identify at least one gap (preferably an important one)**
  - Studies have shown that URM groups are reasonably represented at college level, but not quite beyond college (xx% vs. yy%). We need to identify novel ways to increase representation. ZZ method has not been tried, but this method may be quite good because …

- **Make a case as to why your study will address that gap and advance science.**
  - We are going to use the ASCEND Method to enhance the diversity of biomedical research workforce.

IMPORTANT TOPIC

- **Requires some knowledge of the field and the literature.**

- **Depends on the field, place, and time**

- **For example, in public health studies:**
    - **How many people are affected?**
    - **How lethal is that exposure or disease?**
    - **How common is the exposure under study?**
    - **How much can this exposure be modified?**
    - **....**

- **Or in enhancing diversity, it may be:**
    - **How wide the gap is.**
    - **Where the gap is.**
    - **...**

IMPORTANT TOPIC: EXAMPLE 1

- **Depends on the field, place, and time**

- **For example, in public health studies:**
    - **64,000 new cases of pancreatic cancer are diagnosed in the US each year. 5-year survival rate is only 5% to 10%. There are currently no treatments that substantially enhance the survival. We aim to test drug XX …**

IMPORTANT TOPIC: EXAMPLE 2

- **Depends on the field, place, and time**

- **For example, in public health studies:**
  - **URM – including African-Americans, Hispanics, Native Americans and Alaskans – constitute 35% of the population of the US, but they constitute only 10% of the biomedical research workforce.**
  - **This diminishes the capacity of the nation to be competitive in biomedical research. Talent is distributed evenly but access is not …**

FEASIBLE

- **Requires showing experience, availability of equipment, knowledge of techniques …**

- **Feasibility depends on:**
  - **Preliminary data**
  - **Previous relevant work**
  - **The research team**
  - **Environment**
  - **...**

FEASIBLE: EXAMPLE 1

- **Feasibility depends on:**
  - **Preliminary data**
  - **Previous relevant work**
  - **The research team**
  - **Environment**
  - **…**

  - **We have established a cohort of 50,000 people, of whom 8,500 people are opium users. We have followed this cohort for 6 years and now have 600 cancer cases, including …**
  - **The data are available …**
  - **The research team includes X and Y and Z, with expertise in medicine, epidemiology, and biostatistics. The team has previously published on both opium use and cancer (see biosketches). The team has collaborated on many papers before …**
  - **The requirements are only a computer and statistical software, both available…**

FEASIBLE: EXAMPLE 2

- **Feasibility depends on:**
  - **Preliminary data**
  - **Previous relevant work**
  - **The research team**
  - **Environment**
  - **…**

  - **MSU is a historically black university, with 90% of students being from a URM backgrounds. XX number in biology, YY number in chemistry, ZZ number in nursing, …**
  - **The team has substantial experience in conducting training programs for URM students. Dr. XX has 20 years of experience …**
  - **MSU has is highly supportive of this effort (see the letter of support from President Wilson …)**

SOLID METHODOLOGY

- **Depends on the field, subject of the study, and time**

- **Requires substantial technical knowledge, funding, time, …**

- **For example, in epidemiologic studies:**
  - **Is this the right population?**
  - **Do we have the right control population?**
  - **Is the sample size large enough?**
  - **Are the diagnoses complete and correct?**
  - **Are the questionnaires validated?**
  - **Are the biological samples properly stored?**
  - **Are the individuals doing the lab work expert in their work?**
  - **Are the lab methods solid, with the right instruments, right controls, ….?**
  - **Are the statistical methods correct?**
  - **….**

SOLID METHODOLOGY: EXAMPLE

- Are the diagnoses correct and complete?
- In the GCS, nearly 100% of deaths are captured via documents collected from participants, hospital files, and verbal autopsy questionnaires, which are reviewed by at least two independent internists to define diagnoses according to the International Classification of Diseases, 10th Revision codes (38-40). All-cause mortality included all reported deaths. Cardiovascular mortality included deaths attributable to IHD, cerebrovascular accident, sudden cardiac death, congestive heart failure, hypertension, chronic rheumatic heart disease, pulmonary embolism, and other cardiovascular system diseases not otherwise specified. The mean follow-up time in the derivation and validation cohorts was 10.2 years and 10.9 years, respectively. Mean time to all-cause death in the derivation and validation cohorts was 6.2 years and 6.1 years, respectively. Mean time to cardiovascular death in both the derivation and validation cohorts was 5.8 years. In both derivation and validation cohorts, all-cause mortality was 13% and cardiovascular mortality was 6% over the 12 years of follow-up time.

RESPONSIVE
TO THE SUBJECT OF THE FOA

- We usually have a good idea, and then search for the right FOA.

- Sign up for PIVOT-RP
- Talk to senior colleagues
- Talk to colleagues from other institutions whom you trust
- Talk to federal agency program officers
- Search other databases, such as the NIH RePORTER
- …

- Make sure that your topic is of interest to the funding agency and that it is the right mechanism.

FOA: EXAMPLES

- **You have a good idea for doing research on a certain topic in physics. You need about $125,000 of direct costs per year for three years. Consider applying for an NSF EiR (Excellence in Research).**

- **You have a good idea for a research on a certain cause of ophthalmic diseases. You already have the data and only need to do a secondary data analysis. You need about $50,000 of direct costs per year for two years. Consider applying for an NIH R03.**

RESPONSIVE TO SPECIFIC REVIEW CRIERTIA

- **General criteria for reviewing almost any grant were reviewed in the previous slides.**
  - **Innovation**
  - **Feasibility**
  - **Importance**
  - **…**

- **However, each FOA may have some specific review criteria.**

- **Read the FOA very carefully, and make sure you address them.**

WELL-WRITTEN (1)

- There are many techniques for making your grant interesting to read. You will find some by searching the internet.

- Flow:
  - Start with a captivating sentence.
  - Continue with the salient and relevant parts of the literature.
  - Identify the gap and make it clear that this is a gap (perhaps bold).
  - Tell the reviewer how you will address the gap.

- Format:
  - Use graphs when needed.
  - Make your most important sentences bold or frame those sentences.
  - You may use memorable sentences, as long as the text does not become cheesy …

WELL-WRITTEN (2)

- **Compartmentalize by aim.**

- **Aim 1**
  - **Innovation**
  - **Feasibility**
  - **Methods**
  - **….**

- **Aim 2**
  - **Innovation**
  - **Feasibility**
  - **Methods**
  - **….**

FINAL WORDS

- Writing a great research plan depends on the field, time, geography, etc. There is no single formula.

- However, to enhance the chances of success, we should:
  - Be very knowledgeable of the field;
  - Forge collaborations;
    - Expertise
    - Equipment
    - Larger sample sizes
    - Credibility
  - Be able (or learn) to write well
  - Find the right FOA and follow the instructions carefully.

QUESTIONS?