Mission Statement:
Over the last decade, budget pressures and a steep rise in the number of proposals have had an impact on researchers and funding agencies in the fields of Astronomy and Astrophysics. The decreasing success rate of individual proposals, a general decrease in funding levels in many agencies, and increased reviewer load has been a topic of concern within the community. Consequently, a working group has been formed under the auspices of AAAC, including representatives from CAS, CAA, AAS, and NAS, in consultation with representatives from the relevant divisions of NSF, DOE and NASA. Its purpose is to evaluate the effect of this changing environment on the health of the field, specifically addressing whether this will result in an unacceptable restrictions in the range of new scientific initiatives and negatively impact career choices of the most promising researchers. It is already creating an unsustainable load on reviewers and has led the agencies to consider solutions to the problem (such as reducing the frequency of solicitations or restricting the number of proposals per year). This working group will gather relevant demographic data in order to understand how the funding environment over the last 10 years has affected researchers and projects. Of particular concern is the balance between National Labs and Universities, and between individual researcher grants and large projects. We will compare funding models across agencies and determine appropriate metrics for evaluating success. This will allow us to provide data-driven projections of the impact of such trends in the future, as well as that of any proposed solutions.

Define the Problem

Defining the Problem should be high level. The data presented should consist of:
1. Funding available trends (plus some detail about proportions of projects and individual grants)
2. Success rate trends
3. Number of proposals submitted trends
4. Requested and awarded funds per proposal

The problem, and therefore its solution, depend on the agency funding policy and available budget.

➔ ***NSF AST***
****** Prisca's first draft for NSF Astronomy*****
At NSF Astronomy has remained stable at 18% of the MPS budget. Money available for single investigator and midscale grants have increased by 60% since 2004, but are expected to shrink over the next 5 years as new projects (ALMA+DKIST+LSST) come online. The success rate in 1990 was 50%, but by 2004 it was 30% and has now dropped to 15%. This is mirrored by a doubling of proposals every decade from 1990. The average proposal cost has increased from 93k – 150k.

➔ ***NSF AST***
***** James L first draft . Some parts will have to go in other sections of the report *****
The AST division of NSF receives about $240M per year, roughly 18% of the larger Math and Physical Science (MPS) budget, a fraction that has held fairly steady over more than

the last decade. In 2013, NSF AST allocated $42.4M to its Astronomy and Astrophysics Grant (AAG) program, about 17.5% of its total division budget of $239M. This fraction has also held relatively stable over the last 10 years. Also stable is the relative breakdown of personnel (40% of AAG grant allocations) vs. travel, overhead, etc. What has NOT held stable is the number of grant requests to NSF AST: that number has risen from 238 in 1990 to 317 in 2000, 586 in 2010, and 732 in 2014. The average proposal cost has increased from $93k to $150k over the same 25-year period. The commensurate grant success rate has fallen from 50.4% in 1990 to a low (so far) of 14.8% in 2012. Although some (<100) researchers serve as PI and/or Co-I on multiple grants per year, the great majority (>500) of PIs submit at most one grant per year. The division is reporting severe pressure on review panels and difficulty filling those panels. NSF AST is already urging PIs and CoI's to limit themselves to one grant proposal per year, and is considering reducing the frequency of AAG calls as well as officially restricting the number of proposals permitted. It is not yet clear exactly which parts of the US astronomy community are responsible for the large increase in proposals over the last 25years: seasoned senior faculty looking to fund summer salary, students, and postdocs? Postdocs seeking soft money support to pay their own way? Multiple groups, but each submitting more proposals per year as the budgets get more constrained?

➔ ***NSF PA***

NSF Particle Astrophysics overlaps in key areas of dark matter and HEP gamma rays. Their funding has decreased? The success rate has gone from _ in 2004 to _ in 2014. Number of proposals in PA compared to other divisions, etc. Funds requested/awarded. Avg proposal cost?

***** Angela O. fill in *****

➔ ***DOE Cosmic***

DOE HEP budgets have been declining over the last decade. The proportion dedicated to research went from 30% to a high point of 58% in 2009 at the expense of projects, fueled by R&D for new projects. As new projects come online, P5 recommended that research be maintained at 40%. The success rates for HEP overall are _____ for university programs and have been relatively constant, but the proportion of funding per PI has gone down (need details). In 2012 the HEP University program was split into "Frontiers". The cosmic frontier comprises ~14% percent of the HEP budget. In the three years since these areas have been separate, the CF success rate for renewal is 100%, while it is 36%, compared to HEP overall of 85% (renewal) and 24% (new). *** these numbers are from 2014 – need data for 2015 and then do an average* ***. Since DOE is mission-driven, proposals are judged on their relevance to the DOE CF priorities. Thus, a more relevant statistic is that the funding per PI has gone from ___ to ___ for the University HEP program. The ratio of awarded to requested funding has dropped from ___ to ___. In the last 3 years of the cosmic frontier, the same metric was ____. Over the course of the 3 years, it has not changed within statistics.

➔ ***NASA Astro***

The budget for NASA Astrophysics has been slowly rising, yet the success rate has fallen from 30% in 2004 to approximately 18%?? as the number of proposals has doubled. The

funding per proposal has gone up?? Down?? How much requested vs actually awarded.
Keivan's text will replace this. *

➔ ***NASA Planetary*** (***Jim B. fill in*** –concentrate on what is different than NASA Astro)

➔ ***NASA Helio*** (***Todd fill in*** – concentrate on differences.)

Impact

1. Effect on Proposal writers
    Introduction describes possible lost opportunities, lost science
        (Author name here)
    AAS (survey) on self-reported researcher motivation and pressures
        ***** Report on our intention to do a survey***
        ***** Is there data already existing just for this report?***
            Todd? James L? Talk to Joel
2. Effect on Reviewers

    Work load on Researchers reduces their research time
    Reviewer Burn-out reduces pool
    Reviews may not be fair: rushed or not enough varied reviewers
    COI winnowing of experts (worse effect when pool is reduced)

***** This can be written without data – unless there is some??? *****
        ***** author needed *****

3. Effect on Agencies
    Cost and Manpower in reviews
    More time spent to collect enough reviewers.

***** Liasons need to talk to their agencies and come up with some data***

Drill down to answer questions

1. Who is writing the proposals?
    Some general demographics on Jr vs Sr researchers, gender, minority
***** Liasons and agencies get this now*****

2. Why are there more proposals?
    Present question: More astronomers or more proposals per astronomer?
    Plot of the types of proposals vs time, with bump-ups after exciting
        breakthroughs (e.g. accelerating universe, exoplanets…)
    ***** Author needed *****
    Examine increasing membership in AAS, APS, AGU
        Provide appropriate caveats and understand bias
        Analyze and compare membership vs field

Attendance at major conferences (e.g. Lunar and Planetary Conf.)
Determine flow from one field to another

****** Need someone to get the info from AAS (name), APS (name), AGU (name)*****

Postdocs becoming Profs

Detail previous efforts to encourage postdocs
Examine new PIs demographics: total numbers, type of institution

***** Is this data available? Author? *****

3. What is the quality of new Proposals (determine a metric for this)

Are there just more poor proposals or are we loosing out on very good ones.

****** Keivan continue this *******

4. Why are proposals asking for more money?

Document trends in funding per proposal. (done in first section – just refer)
Determine drivers to cost (University vs Project vs Lab)

e.g. rising overheads, number of students & postdocs, research staff

***** Author needed *****

Does higher cost per proposal reduce success rates overall?

**** requires correlated info – does it exist? ****

Possible Responses

Describe some of the options

One proposal per PI, every 2 years, Pre-proposal step, funding caps, enforce number of grants, programmatic rules, others?)

List of places where this has been tried and what the results were.
Unforeseen consequences can occur ➔ data required
Targeted data needed to answer these questions

****** this is speculative for report, but tries to define what new data we need *****

****** Author Needed ******

Future Plans

Find the answers to the targeted questions
Survey of proposer and reviewer pressures by AIP as follows:

Draft from AAAC Demographics
Iterate with CAP
Present case and set of questions to AIP
AIP allocates funds to do a professional survey of the membership of

AAS, APS (relevant divisions) and AGU.

Write up report and disseminate results.

****** This is just a statement of what our plans are – do later *******