COMPETITION AND PROPOSAL WRITING IN ASTRONOMY

R. W. O'Connell, ASTR 8500, Sp 2026

"Science is competitive, aggressive, demanding. It is also imaginative, inspiring, uplifting. You can do it, too."

--- Vera Rubin

Competition in Astronomy

- A fact of life: no ivory tower in the ivory tower
- Resources competitively awarded
  - Jobs
  - Money
  - Observing time
  - Big computer time
  - Publication space
  - Speaking time
- One important "free" resource: the literature

Mitigating Factors

- Competition is part of almost all professions
  - (Be glad you're not dealing with human subjects)
- Alternative to competition? By-right/guaranteed access tor a small number of scientists
- Competition encourages you to review your goals and progress – a good thing
- You are competing for access to fabulous facilities offering unprecedented scientific capabilities

THE NATIONAL BUDGET FOR ASTRONOMY (2016)

NSF	NASA	DOE, DOD	Univ/Priv*	Total**	Number Astronomers***	$$/Astronomer
$250M	$2950M	~$50M	~$150M	$3400M	~8000	$425,000

*Research support; excludes basic faculty salaries.

**The federal budget for astronomy is ~0.08% of the total federal budget of $4.0T or $10.09 per US citizen per year.

***AAS membership, 2016

Most of budget supports design, implementation & operation of large, shared facilities on the ground and in space [20-30 year cycle].

Rule of thumb: maintenance & operations of existing facilities run 5-10% of the capital investment per year. Adds to base budget.

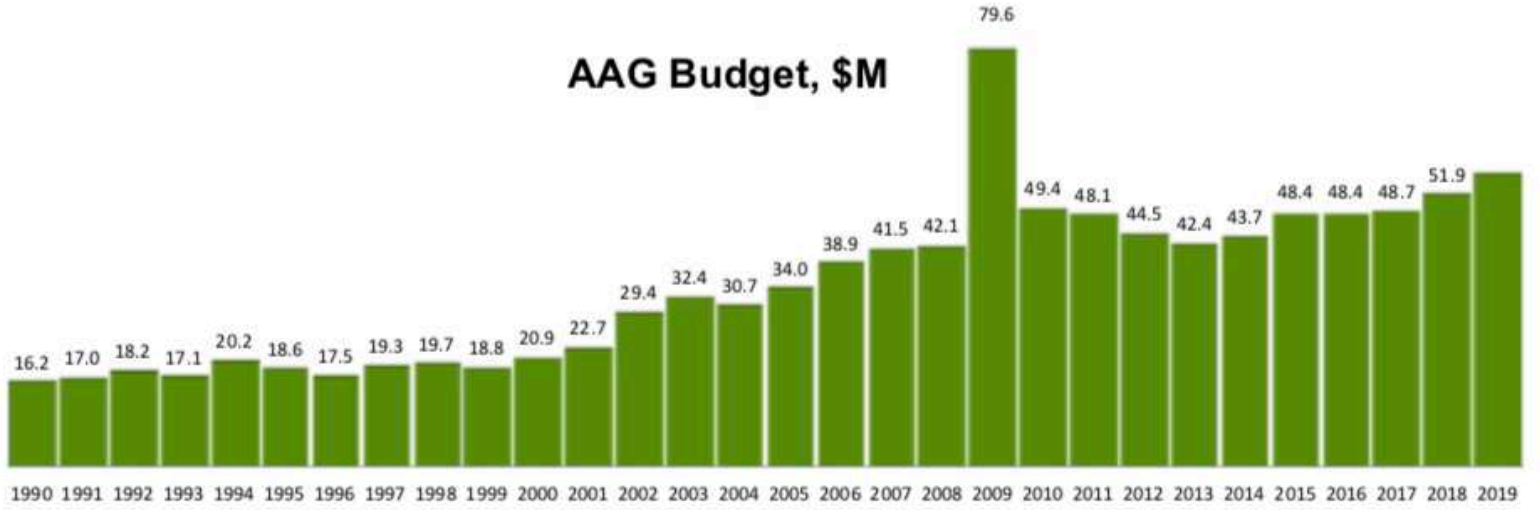
"Decadal Review" process (by astronomical community) sets priorities for subsequent decade. (Latest: 2020.)

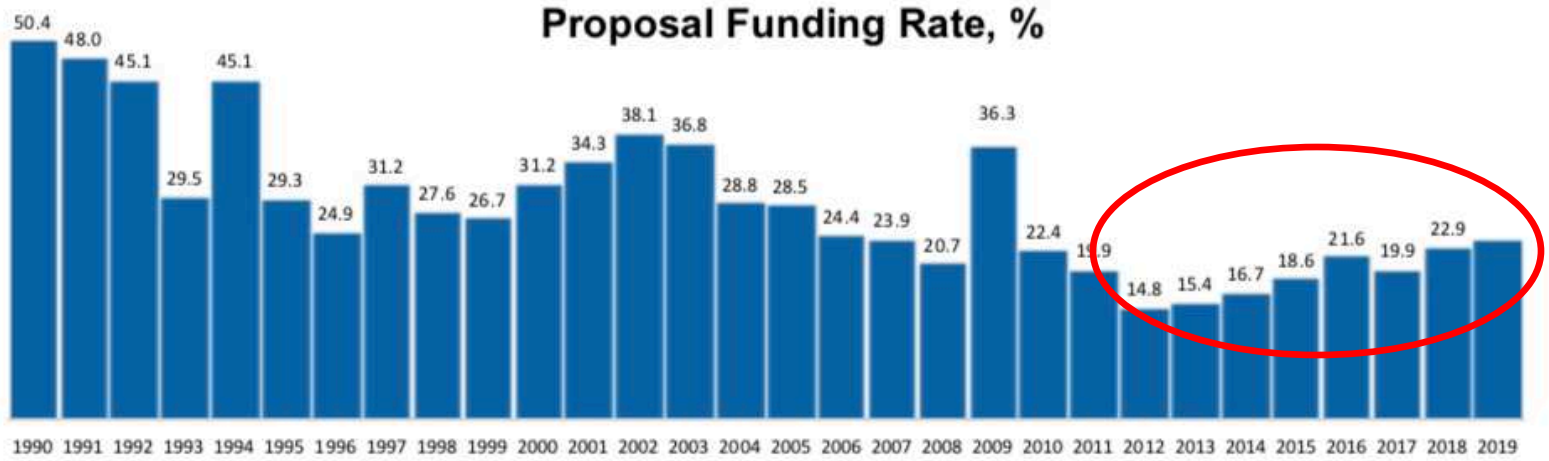
Funding agencies have *historically* followed Decadal priorities.

Primary Funding Agencies

- **NSF**
  - Supports ground-based observatories – NOIRL, NRAO, Gemini, Rubin LSST, solar…
    - Little/no support for "guest observers"
  - Individual research grants
- **NASA**
  - Supports space missions – HST, JWST, CXO, TESS, Roman, planetary, suborbital…
    - Supports "guest observers"
    - Supports mission teams
  - Individual research grants ("ROSES")
  - Prize postdocs

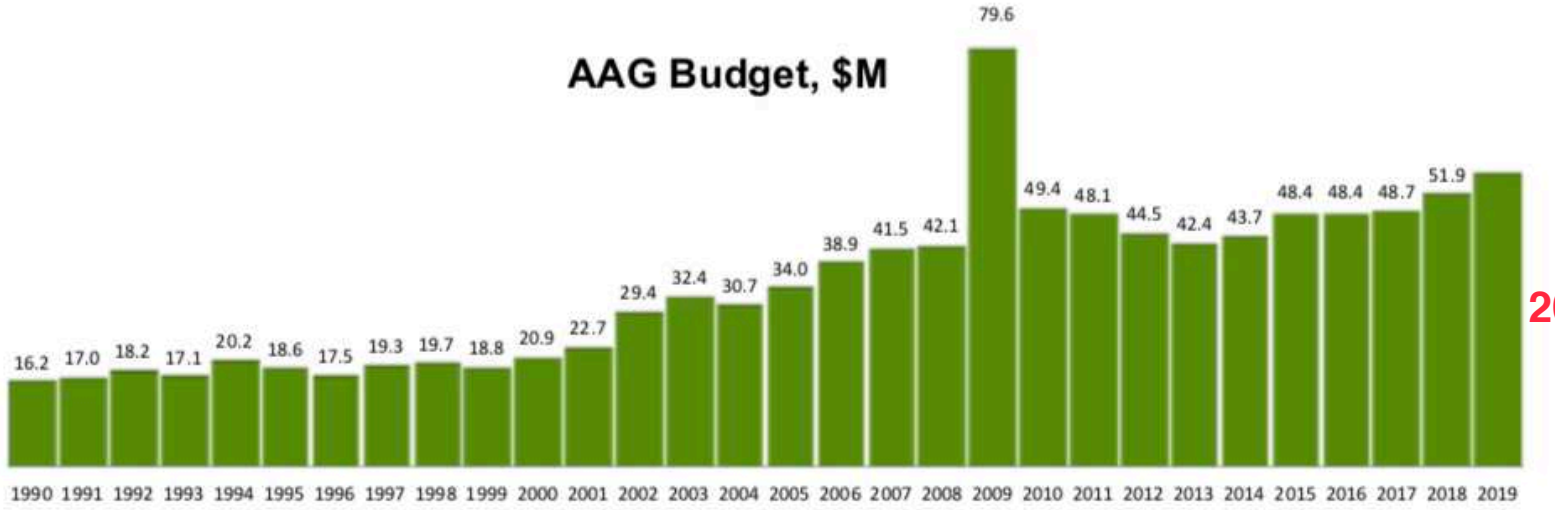
NSF Astronomy Grants Program





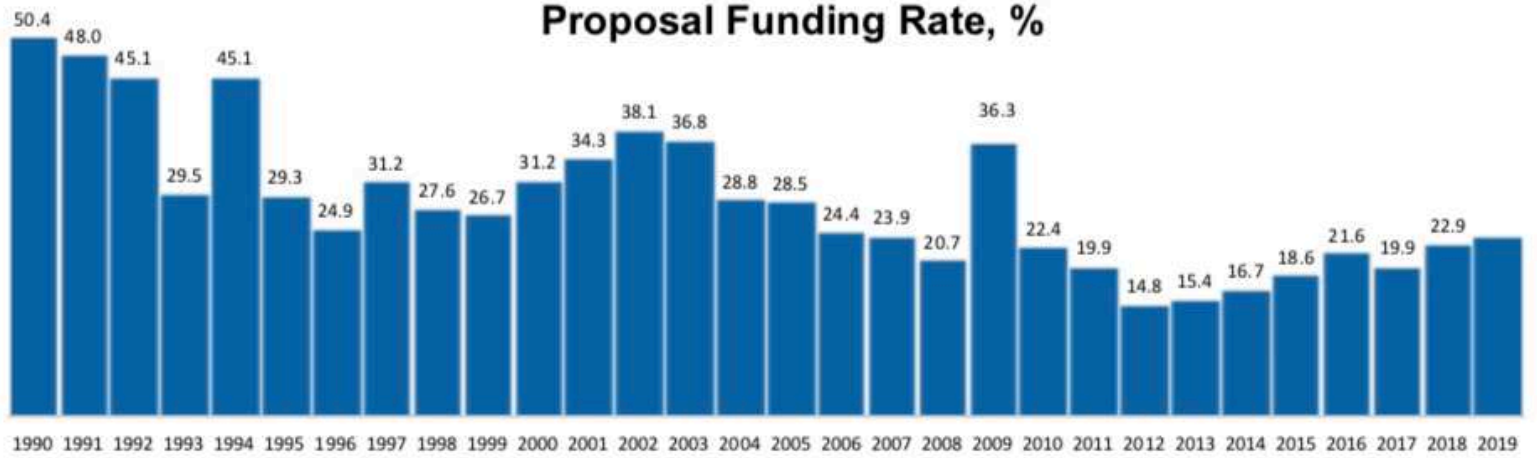
~ 23%

NSF Astronomy Grants Program

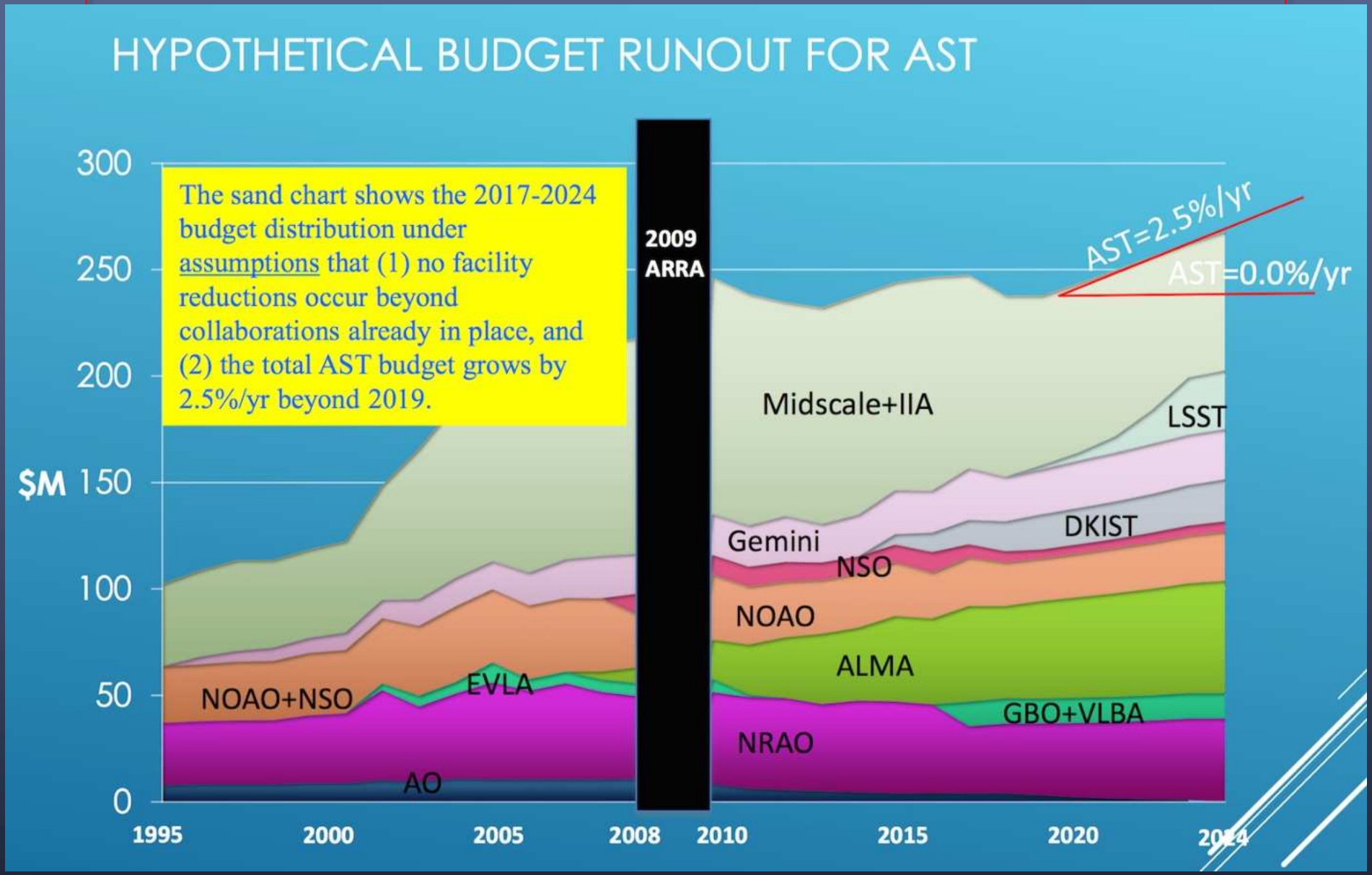


2022: ~ $60M

NASA/JWST: ~ $60M

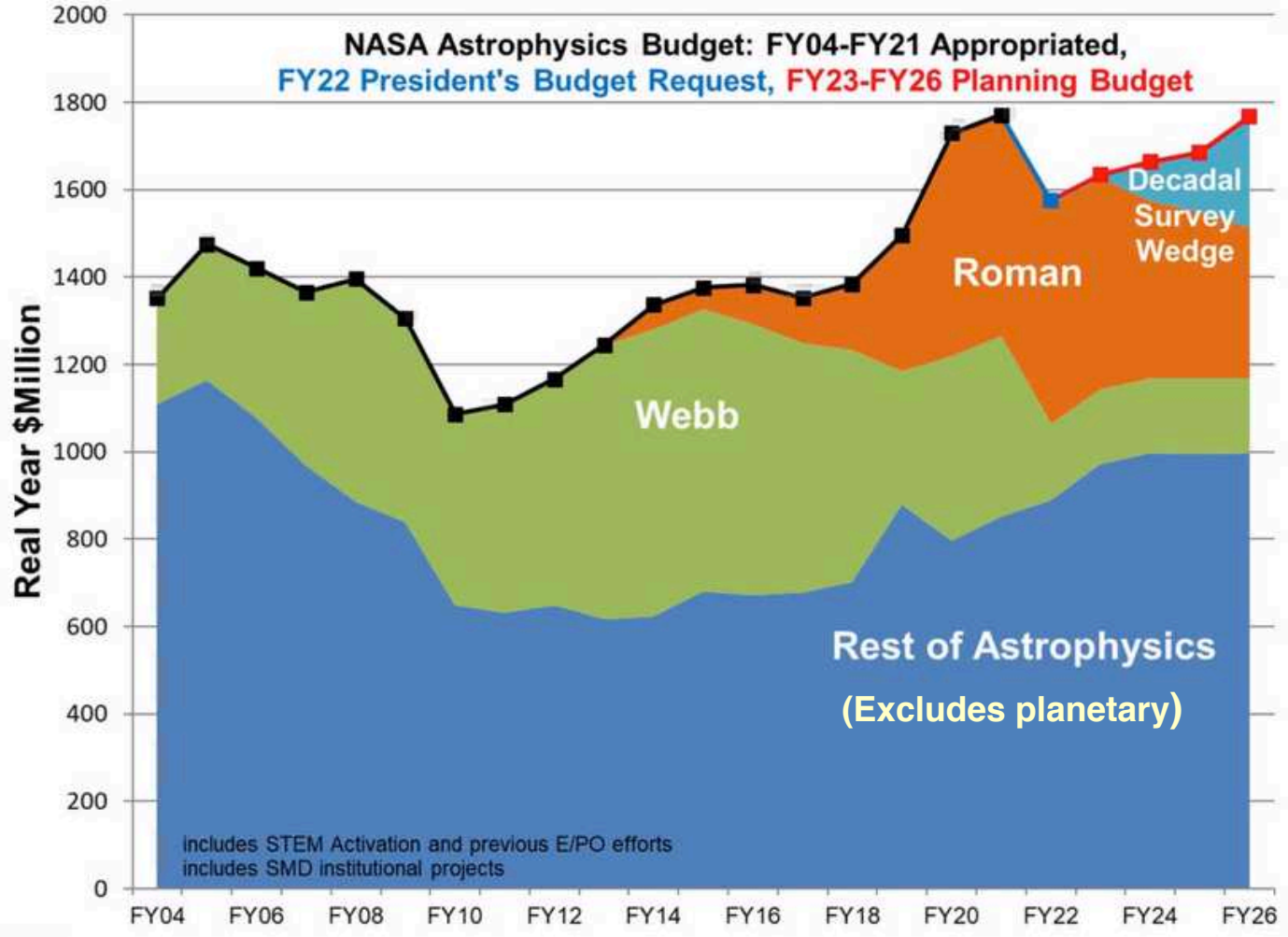


NSF


HYPOTHETICAL BUDGET RUNOUT FOR AST
The sand chart shows the 2017-2024 budget distribution under assumptions that (1) no facility reductions occur beyond collaborations already in place, and (2) the total AST budget grows by 2.5%/yr beyond 2019.
2009 ARRA
AST=2.5%/yr
AST=0.0%/yr
$M
300
250
200
150
100
50
0
1995
2000
2005
2008
2010
2015
2020
2024
Midscale+IIA
LSST
DKIST
Gemini
NSO
NOAO
ALMA
GBO+VLBA
NRAO
NOAO+NSO
EVLA
AO

NASA

Astrophysics Budget – FY22 Request



Writing *Curriculum Vitae*

- Often your introduction to others
- Describes training, experience, productivity
- Keep it organized, clear, uncrowded, succinct
- An exercise in *tempered self-promotion*
  - Social media a BAD influence here
  - My advice on social media? Treat like a mine field
- See nice examples of CV's (Brett, Nitya) posted
- See "Advice on Writing CV's," posted

Writing Proposals

- Normally dual-anonymous competitive peer review
- Up to 3000! proposals under consideration; triage!
- Success rate: 10-40%. Tough competition!
- Reviewers have little time to review
- They're looking for reasons to reject
- So:
  - Plan ahead
  - Write for smart but uninformed people
  - First impressions are critical (abstract, illustrations)
  - Practice during graduate school
  - See "Tips on Writing Proposals," posted