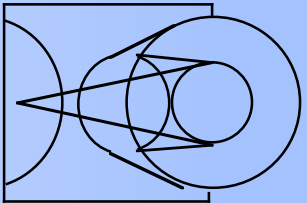


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Proposal Solicitation and Selection for the 21st Century

Glenn Miller, Palle Moller,
Meg Urry, Brett Blacker

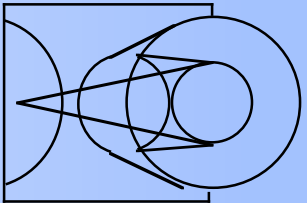


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Abstract

A crucial part of the science mission of an observatory or space mission is creating the program of observations to be executed. Most missions have a "general observer" program where observations are selected from the scientific community based on the merit of the idea. This solicitation and selection process is at present a significant operational expense: Mailing paper copies of proposals and gathering reviewers for a "time allocation committee" meeting involves a large amount of logistical support and time by the observatory staff and reviewers. A less obvious, but perhaps more important cost is that batching proposals into six month semesters or yearly cycles increases the time from concept to data receipt which decreases the ability to respond to new scientific developments and increases the general operational overhead of handling a large batch of observations.

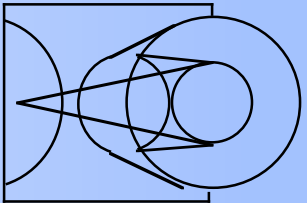
In this paper we explore three experimental steps towards an optimal proposal selection process: streamlining the current process via "paperless" and "groupware" technologies, use of a "steady state" process which accepts submission of and reviews proposals continuously, and a "voting" method which provides for broader community definition. The pros and cons of each approach are examined and the requisite enabling technologies are identified.



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Overview

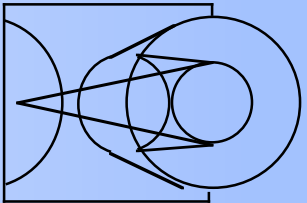
- n Today's Proposal Solicitation and Selection Process
- n Areas for Improvement
- n Three Candidate Approaches
 - u Pros and Cons
 - u Enabling Technologies
- n Measuring the Selection Process



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Proposal Selection

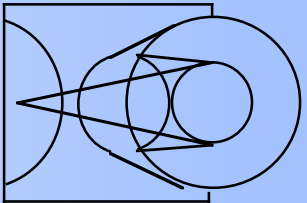
- n An extremely important process
 - u Determines the scientific results from an observatory and shapes the careers of its users
- n Observatories are oversubscribed, typically by a factor of 4
 - u Most recent HST solicitation (Cycle 7) 1298 proposals submitted, 297 accepted (23%)
 - u 21,734 orbits requested, 3304 accepted (15%)



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Today's Process: Preparation

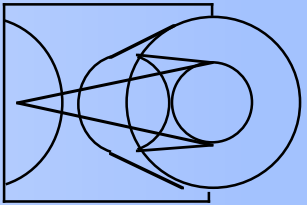
- n “Call for Proposals” and other documentation prepared and published by observatory
- n Astronomer writes proposal and submits by deadline
 - n Must understand observatory and instrumentation by reading documents, consulting with observatory staff, etc...



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Today's Process: Peer Review

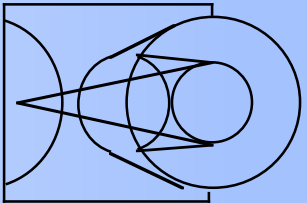
- Proposals assigned to one or more reviewers
 - Reviewers read and grade proposals
 - Observatory staff reads proposals to note any technical feasibility issues
- Most proposals are of high quality. Very few flawed proposals (either from technical or scientific standpoint)



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Today's Process: Selection

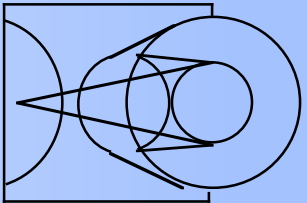
- n Generally a two step process:
 - u Proposals assigned to panels by specialty (e.g. cosmology, hot start, planets)
 - u Overall “Time Allocation Committee” (TAC)
- n Observatory provides guidelines for available resources, e.g. number of orbits
- n Panels discuss proposals, make ranked list
- n TAC merges rankings of panels
- n Results of TAC advisory to Director



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Today's Process: Notification

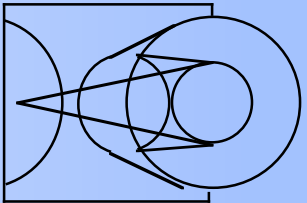
- Proposers notified of results
- Proposers may appeal



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Today's Process

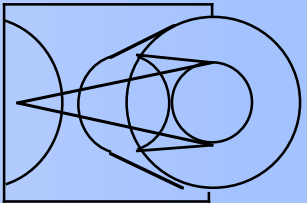
- Space and ground based observatories follow this general process.
- Typically an annual (space-based) or bi-annual (ground-based) solicitation "cycle"



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Today's Process is Expensive

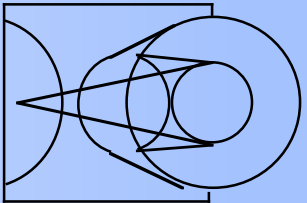
- n Mailing paper copies of proposals to reviewers/panelists/TAC
- n Recruiting Panel and TAC members
- n Logistics of Panel and TAC meetings (travel, hotel, meeting rooms)
- n Tracking system for proposals
- n Observatory staff needed to manage logistics and tracking



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Today's Process is Inflexible

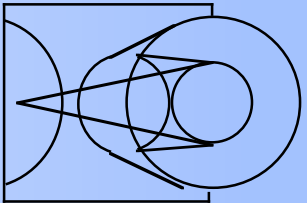
- ┆ **Batching proposals into cycle creates peaks in processing, e.g. computer resources needed at submission deadline, staff needed to handle meetings**
- ┆ **Process is sensitive to initial prediction of available observing time:**
 - ┆ **If you allocate too little time, then observatory will be idle at times**
 - ┆ **If you allocate too much time, then it takes even longer for observers to get data**



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For 21st Century Observatories

Must decrease cost of administering
selection process while still ensuring
highest quality science is selected from
community



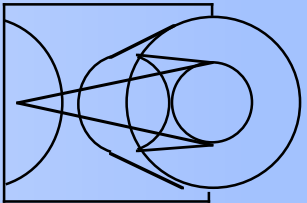
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Three Approaches

- n 1. Streamline current process with “paperless” and “groupware” technologies
- n 2. “voting” method
- n 3. “steady state” process which accepts proposals at any time and reviews continuously

What enabling technologies are required?

What are benefits and drawbacks?

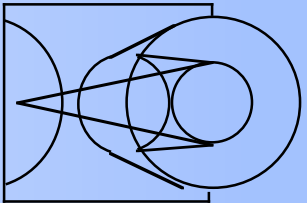


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Streamline Current Process

Many observatories have taken steps in this direction

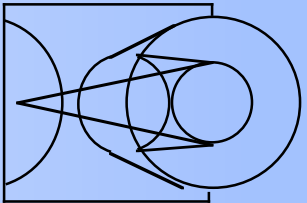
- ↳ STScI accepts proposals electronically via email; automatic acknowledgment
- ↳ Proposal preparation aids: Call for Proposals and Instrument Handbooks are on WWW.
- ↳ Exposure time calculators for instruments. Includes libraries of astronomical objects (e.g. stars, galaxies)



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Additional Areas for Improvement

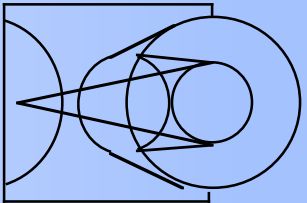
1. Electronic Review of proposals
2. Distributed Panel and TAC meetings
3. Triage process



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Electronic Proposal Review

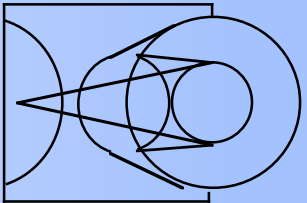
- Within Today's technology: secure distribution of proposals, secure return of grade and comments
- Many reviewers note that paper is the preferred form for reviewing proposals. Can read on an airplane (or beach), can make notes in margins, etc..



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Electronic Review (contd)

- n Enabling technology: truly portable computers**
- extremely lightweight (e.g. Newton or Pilot weight) and very rugged**
- display capacity of 8.5x11 inch sheet of paper. (At 300 dpi, this is a 2550x3300 display)**
- workstation speed and data storage**
- connected to Internet at all times**



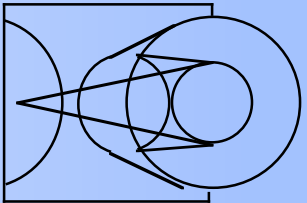
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Electronic Review (contd)

Enhancing technology:

- "data mining" or "agent" technology which can identify similar proposals to facilitate fair comparison.

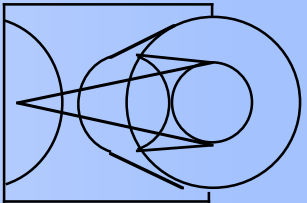
When reviewing 100 proposals it can be difficult to find similar proposals in submitted and executing pools.



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Distributed Panel and TAC meetings

- Today's methods for collaboration are still primitive, do not preserve the benefits of face to face meetings e.g. teleconferencing, video conferencing or groupware (Notes, Web, News)
- Enabling technology: truly effective "groupware" collaboration technologies which are order of magnitude improvements from current tools



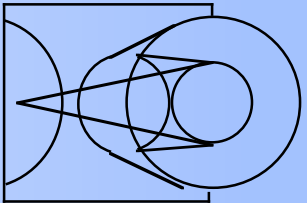
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Triage Process

ⁿ Given high rejection rate (factor of 4:1 is typical), most of Panel review is spent discussing proposals which will not be executed.

ⁿ Triage process could identify the proposals which are either very good or very poor.

^F Con: Without review by panel, difficult to provide proposer with meaningful feedback. Possible that innovative proposals might not get sufficient consideration



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Voting

Make proposals available to community,
e.g. via WWW, allow community to grade
proposals

ⁿ Pro:

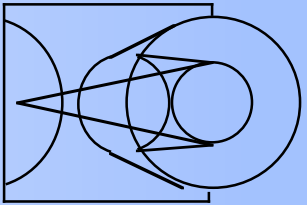
^u widest possible community participation

^u open process

ⁿ Con:

^u could politicize selection process?

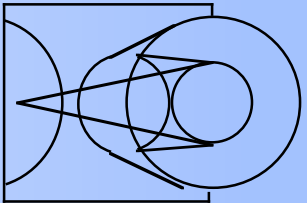
^u easier for unselected proposals to be
plagiarized?



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Steady State Selection

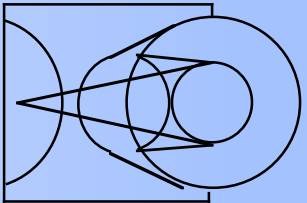
- ┆ Proposals can be submitted at any time
- ┆ Proposals are reviewed “continuously”
- ┆ Panelists review “at home” and submit grades and comments electronically
- ┆ Proposals are selected from the topmost ranked proposals
 - ┆ Would likely still have guidelines for allocations for scientific disciplines, e.g. Cosmology versus stellar proposals



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Pros of Steady State

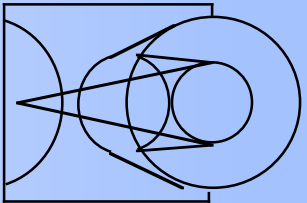
- ₙ Decreases lead time for observations
- ₙ Encourages “science induced” rather than “deadline induced” proposals, i.e.. science which is based on recent results
- ₙ Eliminates need for separate out of cycle proposal process
- ₙ Decreases volume of “work in progress”
- ₙ Allows more flexible response to changes in telescope or instruments



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Cons of Steady State

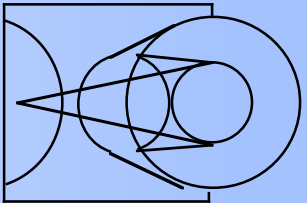
- n** Current TAC process is widely recognized as fair
- n** Act of assembling TAC members at observatory gives community insight into the observatory and they return home with positive impressions of observatory
- n** Current TAC process allows global look at entire cycle's worth of observations



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Quality of Selection Process

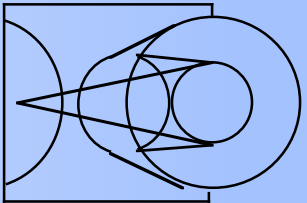
- Today's selection process is “open loop” - there is no direct measurement of quality of the selection process - Was the best science actually selected?



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Quality of Selection

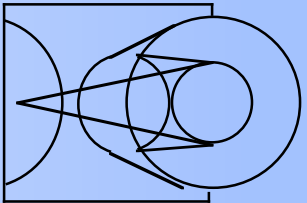
- n In practice this is made difficult by two factors:
 1. A controlled experiment is impossible, i.e.. running two independent TACs, executing on two telescopes and measuring which one is best
 2. How do you measure “quality of science”



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Quality of Selection

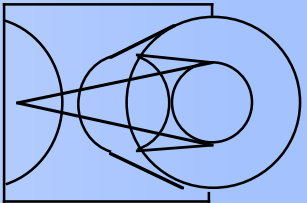
Although measuring quality of science is admittedly very difficult, this should not prevent observatories from making some reasonable attempts at assessing quality of selection process.



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Possibilities for Measurement

- Examples of measurements that are related to quality
- Science Citation Index measures how often papers are cited. Could use this as a measure of impact of an observation.
- Observatories and their funding agencies have review committees. These could identify most important scientific results and relate back to TAC rankings



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Summary

- ┆ Selecting proposals is one of the most important jobs of an observatory
- ┆ Today's process can be improved to provide better service at lower cost
 - ┆ Many improvements require no new technologies
 - ┆ Electronic review and distributed meetings are areas for major technology improvements
- ┆ Observatories should measure their selection process