

IAU Focus Meeting II

Global Coordination Comments & Next Steps

Matthew Colless

Institutional affiliation

Research School of Astronomy and Astrophysics

The Australian National University

Formative experiences

Anglo-Australian Observatory, Giant Magellan Telescope,

EU 'Opticon' Program, Australian Decadal Plan

Big Astronomy

- Mega-scale facilities mean money and politics at a high level...
 - Big Astronomy missions/facilities proceed (or not) in large part for non-science (even unscientific) reasons.
 - Big Astronomy politics occurs at the level of national funding agencies and at ministerial/Cabinet level; also in the multi-lateral international arena

Implications...

- Arguments for funding need to be far broader than just the science case, and astronomers cannot be the only advocates.
- Is astronomy fully professional in working at this level?
- Even where expert at the national level, are we professional at international cooperation?

Big Astronomy

- Big Astronomy is even more greedy than Bernie Madoff !
 - Pyramid schemes like Madoff's Ponzi scam work (for a while) by using the money from later investors to pay earlier investors
 - Big Astronomy cannot use funds from closing old facilities to pay for new ones because the new facilities are so much more costly
 - Since astronomy facilities require increasing funding levels, how do we make stronger economic justifications for such projects without losing sight of our goals in fundamental research?
 - Example: Australian SKA Business Case used an economic consulting firm to 'prove' that hosting SKA had a net benefit to Australia, based on increased economic activity, net inflow of funding, access to hi-tech R&D, and (yes) pure science

A Counter-Trend

- One area where there is a (partial) counter-trend to the spread of Big Astronomy is in the ‘consumerisation’ of space access
 - National space agencies had launch monopolies & were very centralized – makes international collaboration easier in some ways, harder in others
 - Now increasing numbers of launch providers – a proliferation of national space agencies and the advent of multiple private launch capabilities
 - So greater competition, leading to cheaper and more frequent launches
 - Also smaller, cheaper, ‘mass-produced’ satellite technology (e.g. CubeSats)
 - Consequently space astronomy is becoming increasingly accessible (at least for smaller-scale projects)
- Overall this is probably a Good Thing, but likely to complicate international collaboration on space missions in future
 - more ways to do small/mid-sized missions means less pressure to cooperate
 - more pressure to ‘fly the national airline’ and use/justify national space agency

Astro-Economics

- Barter

- Barter is a primitive economic exchange mechanism involving direct swap of different goods for mutual benefit
- Bartering time/access is fine when both parties each want something from the other *and* can agree a rate of exchange
- But this is relatively rare – the barter mechanism is limited either to such well-matched pairs or to fragile daisy-chains of exchanges

- Markets

- Barter has been (largely) replaced by markets based on money, a form of ‘universal barter goods’ with a commonly accepted value
- Some limited money-based markets for telescope access (e.g. the ‘spot market’ in 8-metre telescope time that Australia is currently using)

Astro-Economics

- Question: Why isn't there a more extensive and more liquid market in access to telescopes and astronomical instruments?
- Partial answers (and more questions)...
 - Lack of a 'trader' mindset – facility builders tend to have an 'owner' mindset: they build for specific reasons for a specific community.
Why not build to meet market need and trade access for other facilities?
 - Lack of market information – the availability of potential opportunities (both market and barter opportunities) is not widely disseminated.
Why isn't there the equivalent of the 'Jobs Register' or 'Rumor Mill' where facilities can advertise their desire to buy, sell or swap access?
 - Lack of brokering services – there are no agents or services that match up buyers and sellers (or swappers) of telescope access.
Why isn't there a 'Match.com', 'AirBnB' or 'Uber' for telescope time?

Coordination Modes

- What are the pros and cons of top-down and bottom-up coordination?
- Top-down...
 - May be more strategic & better funded, but perhaps slow and inflexible (only done occasionally and for largest-scale projects)
 - Focus here has been on top-down coordination collaborative strategies, which are indeed highly desirable and should be explored
 - The IAU provides a good framework for top-down coordination (or at least a good forum for discussions between the relevant agencies)
- Bottom-up...
 - May be more flexible & quicker, but perhaps harder to fund (commonly informal bartering between researchers for small-scale projects)
 - Are there 'macroeconomic policy settings' that can encourage such arrangements by removing obstacles and/or providing incentives?

Conclusions & Next Steps

- Astronomy needs to become even more professional in making the case for big new facilities, marshalling a wider array of arguments and finding better models for public/private and international partnerships
- Astronomy has much to learn from economists, market traders, and venture capitalists in setting up better markets, information sharing, and brokerage services so that we make more efficient use of existing facilities and other resources, and achieve better scientific outcomes at lower cost
- Both top-down & bottom-up approaches to coordination can be effective in appropriate contexts, and both can be enhanced by thoughtful policies
- The IAU can help by forming a Working Group including experts from outside astronomy to actively address all these issues and provide guidance by developing policies and models for future astronomy infrastructure, particularly the largest-scale facilities