NSF Division of Astronomical Sciences (AST): AAAC **Update**

Transitions…

Ralph Gaume

(Acting) Division Director

January 26, 2017

Transitions: AST and MPS

- Ralph Gaume was selected as Deputy Division Director in Nov. 2016
  - In acting DDD role since June 2016
- NSF is conducting a search for a new AST Division Director, to replace Jim Ulvestad
  - Recruitment committee to help identify candidates
    - Roger Blandford, Joel Bregman, Debra Elmegreen, Lyman Page, Caty Pilachowski.
  - Job closes February 6, 2017
- Recent transitions
  - NSF Assistant Director (AD) overseeing Directorate for Mathematical and Physical Sciences (MPS), Fleming Crim, completed his 4-yr term on January 13, 2017.
  - Jim Ulvestad became (acting) AD for MPS on January 14, 2017
  - Ralph Gaume became (acting) Division Director for AST
  - Ed Ajhar became (acting) Deputy Division Director for AST

Division of Astronomical Sciences (AST)

Office of the Division Director

Ralph Gaume
Acting Division Director

Edward Ajhar
Acting Deputy Division Director

Craig McClure
Program Support Manager

Donna O'Malley
Financial & Operations Specialist

Vernon Pankonin
Senior Advisor

Elizabeth Pentecost
Project Administrator

Administration

Allison Farrow
Program Specialist

Stephanie Hill
Program Assistant (Student)

Diana Phan
Program Analyst

Matthew Viau
Program Specialist

Individual Investigator Programs and Astronomy & Astrophysics Research Grants

James Neff
Program Director
IIP Coordinator; Education & Special Programs (REU, PAARE)

Richard Barvainis
Program Director
Extragalactic Astronomy & Cosmology

Glen Langston
Program Director
Galactic Astronomy

Harshal Gupta
Program Director
Astronomy & Astrophysics Postdoctoral Fellowships

Joan Wrobel
Program Director
CAREER; Extragalactic Astronomy & Cosmology

Faith Vilas
Program Director
Solar and Planetary Research Grants

Hans Krimm
Program Director
Stellar Astronomy & Astrophysics

Peter Kurczynski
Program Director
Advanced Technologies & Instrumentation, Major Research Instrumentation

Linda French
Program Director

Facilities, Mid-Scale, & MREFC Projects

Christopher Davis
Program Director
Gemini Observatory

Philip Puxley
Program Director
National Radio Astronomy Observatory

David Boboltz
Program Director
National Solar Observatory

Nigel Sharp
Program Director
Large Synoptic Survey Telescope

Edward Ajhar
Program Director
Green Bank Observatory, Long Baseline Observatory

Joe Pesce
Program Director
Arecibo Observatory

Vernon Pankonin
National Optical Astronomy Observatory

Richard Barvainis
Mid-Scale Innovations Program

Philip Puxley
Atacama Large Millimeter Array

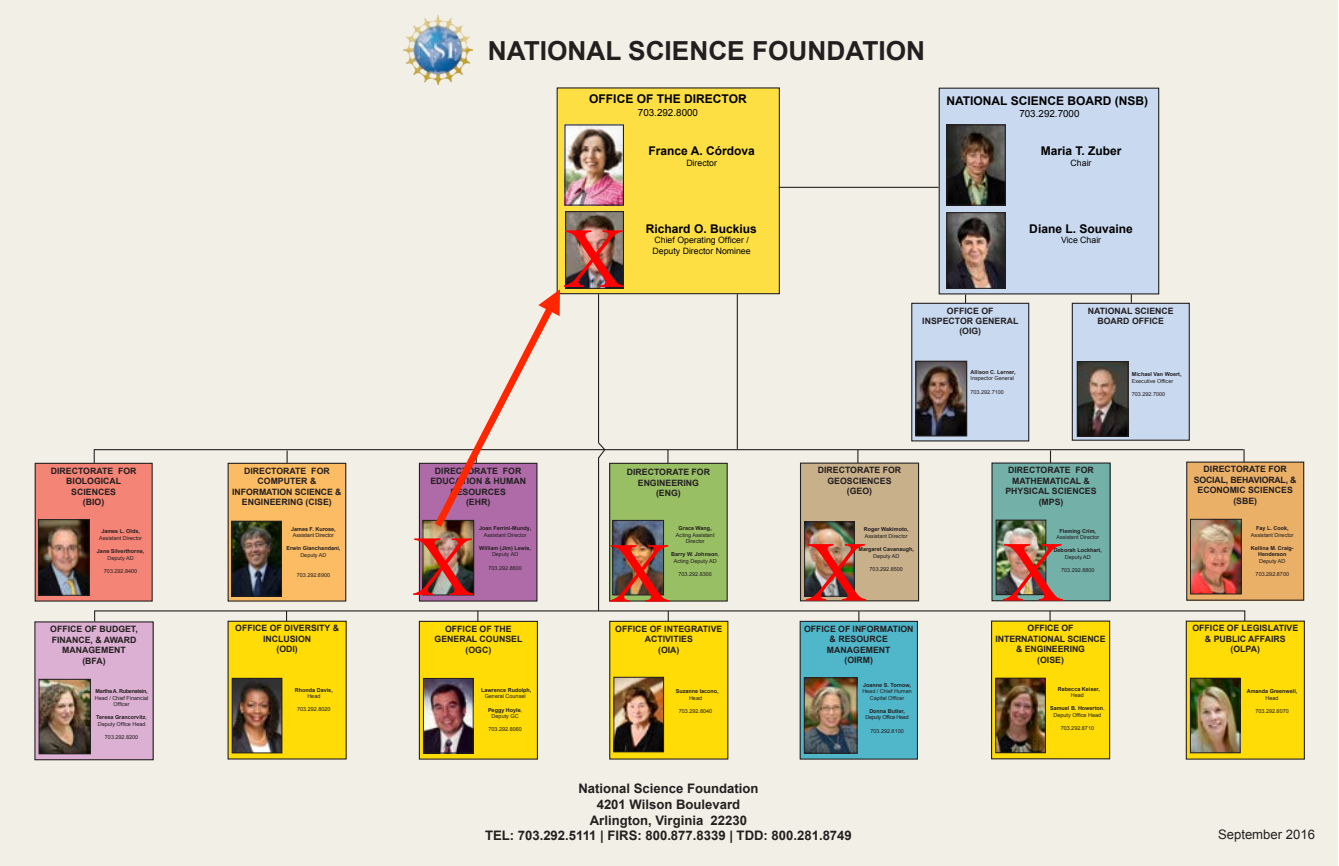
ESM

Thomas Wilson
Program Director

Joe Pesce
Program Director

Transitions: NSF

- Major NSF leadership transition
- January 2017: New Acting ADs for MPS, ENG
- February 2017 New Acting ADs for EHR, GEO, and new Acting Chief Operating Officer



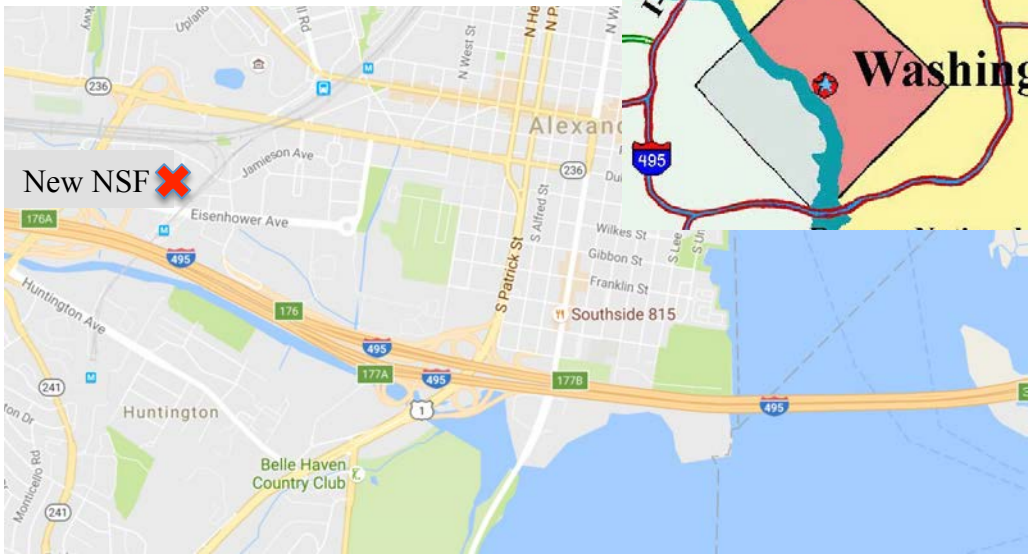
NST/AST Hiring

- AST Division Director
  - Closes February 6th
- AST Pr
- AST Rotators, Intergovernmental Personnel Act (IPA)
  - Open until filled, Google: NSF AST 17-001
    - AST Dear Colleague Letter (AST-17-001)

And if those transitions weren't enough…

NSF is Moving!

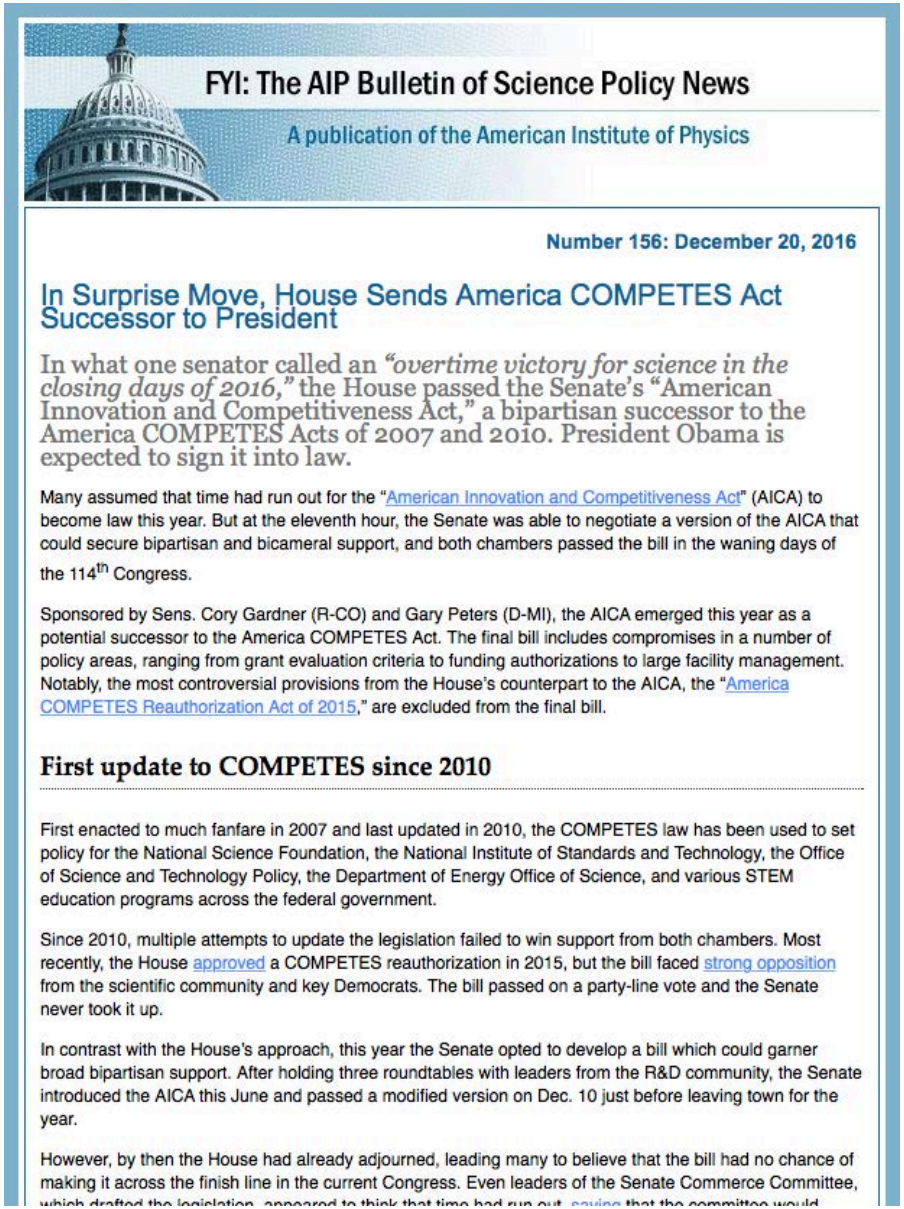
- NSF will move from its current location in Arlington, Virginia to a location in Alexandria, Virginia in July-September 2017.
- The Directorate for Mathematical and Physical Sciences, including AST, is scheduled to move over an extended Labor Day weekend in August/September.



Budget

New NSF Authorization Bill

- "American Innovation and Competitiveness Act" passed Congress in December 2016.
  - Awards should be in the national interest—tied to Broader Impacts review criterion
  - No funding levels specified for NSF as a whole, or for individual Directorates
  - Direction regarding facility oversight
- See FYI #156 (20 Dec 2016) at www.aip.org/fyi



FYI: The AIP Bulletin of Science Policy News

A publication of the American Institute of Physics

Number 156: December 20, 2016

In Surprise Move, House Sends America COMPETES Act Successor to President

In what one senator called an *"overtime victory for science in the closing days of 2016,"* the House passed the Senate's "American Innovation and Competitiveness Act," a bipartisan successor to the America COMPETES Acts of 2007 and 2010. President Obama is expected to sign it into law.

Many assumed that time had run out for the "American Innovation and Competitiveness Act" (AICA) to become law this year. But at the eleventh hour, the Senate was able to negotiate a version of the AICA that could secure bipartisan and bicameral support, and both chambers passed the bill in the waning days of the 114th Congress.

Sponsored by Sens. Cory Gardner (R-CO) and Gary Peters (D-MI), the AICA emerged this year as a potential successor to the America COMPETES Act. The final bill includes compromises in a number of policy areas, ranging from grant evaluation criteria to funding authorizations to large facility management. Notably, the most controversial provisions from the House's counterpart to the AICA, the "America COMPETES Reauthorization Act of 2015," are excluded from the final bill.

First update to COMPETES since 2010

First enacted to much fanfare in 2007 and last updated in 2010, the COMPETES law has been used to set policy for the National Science Foundation, the National Institute of Standards and Technology, the Office of Science and Technology Policy, the Department of Energy Office of Science, and various STEM education programs across the federal government.

Since 2010, multiple attempts to update the legislation failed to win support from both chambers. Most recently, the House approved a COMPETES reauthorization in 2015, but the bill faced strong opposition from the scientific community and key Democrats. The bill passed on a party-line vote and the Senate never took it up.

In contrast with the House's approach, this year the Senate opted to develop a bill which could garner broad bipartisan support. After holding three roundtables with leaders from the R&D community, the Senate introduced the AICA this June and passed a modified version on Dec. 10 just before leaving town for the year.

However, by then the House had already adjourned, leading many to believe that the bill had no chance of making it across the finish line in the current Congress. Even leaders of the Senate Commerce Committee,

FY 17 Budget

- Continuing resolution through April 28
- After April 28…
  - Two (of many) possible FY 2017 budget outcomes
    - Year-long CR or flat budget with respect to FY 2016?
    - Re-balance military/domestic discretionary spending?

FY 18 Budget

FY 18 Budget

(brief comment)

- Sequestration
  - Budget control act of 2011 set spending caps for next 10 years.
  - Bipartisan budget act of 2015
    - Set caps $50B over for FY 16, $30B over for FY 17
    - Suspend debt limit until March 16, 2017
  - Sequestration due to return in FY 2018

NSF Big Ideas

NSF Ideas for Future Investment - "Big Ideas"

Science

SCIENCE POLICY MAY 12, 2016

NSF director unveils big ideas

Plan is aimed at the next president and Congress

"This comes at a time of transition," she told the National Science Board, NSF's over- sight body, on 6 May. "So that makes it **a great opportunity for NSF to present a menu of the things it can do."** And NSF's current budget of $7.46 billion is insufficient to tackle these questions, Córdova told *Science* after the meeting. "We can't do any of these things without future investments. **So yes, we need an infusion of money."**

NSF Ideas for Future Investment - "Big Ideas"

Research Ideas

Harnessing Data for 21st Century Science and Engineering

Shaping the New Human-Technology Frontier

Understanding the Rules of Life: Predicting Phenotype

The Quantum Leap: Leading the Next Quantum Revolution

Navigating the New Arctic

Windows on the Universe: The Era of Multi-messenger Astrophysics

Process Ideas

Growing Convergent Research at NSF

Mid-scale Research Infrastructure

NSF 2050 The Integrative Foundational Fund

NSF INCLUDES: Enhancing Science and Engineering through Diversity

NSF Ideas for Future Investment - "Big Ideas"

Windows on the Universe: The Era of Multi-messenger Astrophysics



*"observe the universe and extreme events in it through three different windows – detection of **electromagnetic waves, particles, and gravitational waves** – to answer some of the most profound questions before humankind"*

NSF Ideas for Future Investment - "Big Ideas"

Windows on the Universe: The Era of Multi-messenger Astrophysics

How did the universe begin?

Why is the universe accelerating?

What is the unseen matter that constitutes much of the universe?

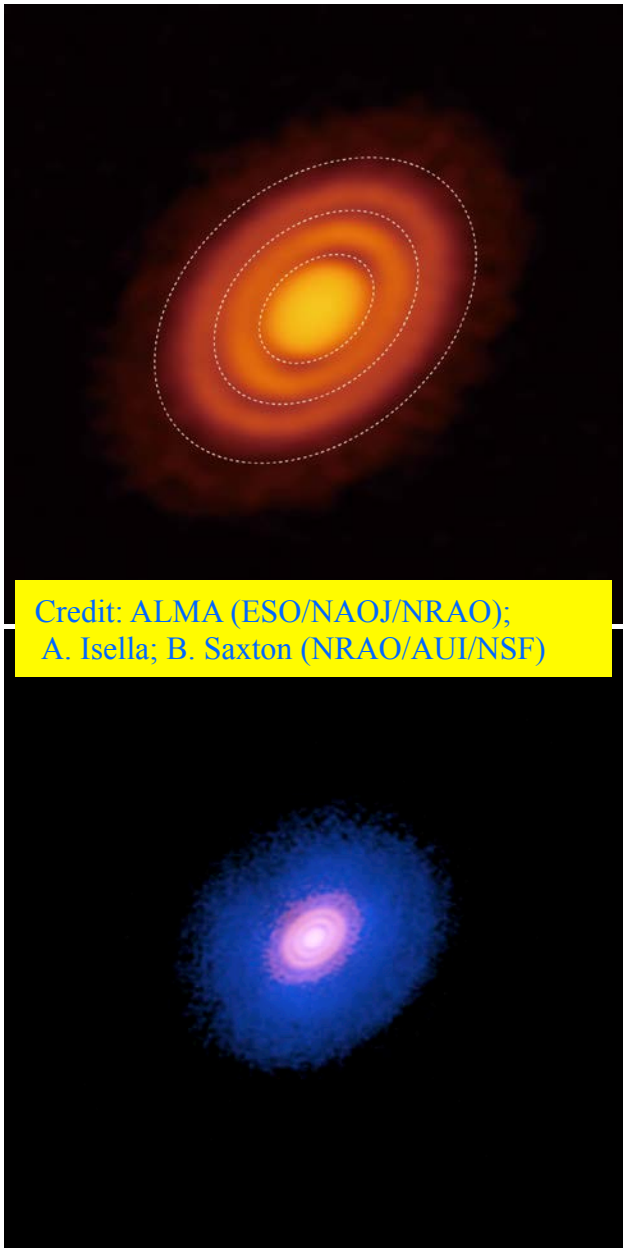
How does gravity work under the most extreme conditions?

What are the properties of the most exotic objects in the universe?

Some Highlights

ALMA: HD 163296

- ALMA observed both (1.3mm) dust and gas (^{12}CO, ^{13}CO, C^{18})
- Three gaps observed in dust ring:
  - At 60, 100, 160 AU
- Disk composed mostly of gas, so critical to observe gas.
- 2nd and 3rd ring depleted in both gas and dust, attributed to potential Saturn mass planets.
- 1st ring depleted in dust, but not gas, likely non-planetary process.
- Isella et al., 2016 (Phys. Rev. Lett. 117, 25)



Credit: ALMA (ESO/NAOJ/NRAO); A. Isella; B. Saxton (NRAO/AUI/NSF)

Arecibo, VLA, VLBA, Gemini: FRB 121102

- Fast Radio Bursts (FRB) are (1-10) millisecond radio pulses of astronomical origin, discovered 2007
- FRB 121102 discovered at Arecibo Observatory during Pulsar ALFA survey
  - Follow up subsequently discovered 10 additional bursts.
- Spitler et al., 2016, (Nature 531, 7593)
- AAS press conference *today*!
- VLA localized the position, and discovered persistent component
- VLBI established coincidence of burst and persistent sources (within 100 ly)
- Gemini N observations have associated the position with a dwarf galaxy

Credit: Danielle Futselaar

Daniel K. Inouye Solar Telescope (DKIST)

- DKIST will be a 4.2-meter solar telescope to study the Sun at the fundamental 20-km scale of the solar magnetic structures.
- Completion in FY 2020 at Haleakala Observatory (Maui).
- Hawaii Supreme Court affirmed construction permit (Oct. 6)
- Top: Artist's view of DKIST enclosure with cutaway
- Bottom: Base ring of Telescope Mount Assembly (right) inside the DKIST enclosure (left).

Large Synoptic Survey Telescope

- 10 year survey of 10s of billions of objects in space and time
- F1.2, 8.4m primary, FOV 3.5d (9.6 sq d)
- 3.2 Gpixel camera, 2 sec readout, ~15 TB per night
- 825 visits per pointing (main survey = 18,000 sq d)
- ~10 M alerts per night, 60 sec latency
- Construction progressing, late 2022 start date for survey.

Recent construction image

… compared to artist's impression

IIP Update

IIP Update

- AAG submission deadline 15 November
  - 592/463 proposals/projects in EXC+GAL+SAA (minus solar)
  - 2% more proposals than 2016, but fewer than peak in 2015
  - Panel planning underway

- *No Proposal Deadline* pilot underway for the Planetary/ Exoplanetary and Solar portions of AAG
  - Will make an assessment at the end of the year

- Mid Scale Instrumentation Program (MSIP)
  - Update (next chart)

MSIP Round 2 Awards, FY 2016-2017

Awarded Proposal	PI	Total NSF Funds	Yr Funded
Zwicky Transient Facility	Kulkarni	$9.0M	FY 2014
Advanced ACTPol	Staggs	$10.0M	FY 2014
H Epoch of Reionization Array	Parsons	$2.1M	FY 2014
Event Horizon Telescope	Doeleman	$6.5M	FY 2015
POLARBEAR	Lee	$5.0M	FY 2015
NANOGrav Phys Frontier Ctr	Siemens	$14.5M (AST 20%)	FY 2015
CARMA closeout	Carlstrom	$2.0M	FY 2014
CLASS-CMB, Large Ang. Scale	Bennett	$4.4M	FY 2016
TolTEC, mm camera on LMT	Wilson	$6.1M	FY 2016/17
HERA	Parsons	$9.5M	FY 2016/17
SuMIRE (Subaru galaxy surv.)	Strauss	$5.5M	FY 2016
CHARA (open access)	ten Brummelaar	$3.9M	FY 2016
Las Cumbres (open access)	Boroson	$3.0M	FY 2016/17
MAPS: The MMT Adaptive optics exoPlanet characterization System	Hinz	$2.0M	FY17

Transitions and Divestment

AST Budget Pressures

- Must plan for possibility of no budget increases for the balance of the decade
- Need to balance facilities, small and mid-scale programs and individual investigator grants
- Mid-decadal survey report stated:

  "The LSST operations cost of $8 million at first, growing to $25 million, will be an additional burden on the AST budget in the first half of the next decade. The committee strongly supports the goal of a balanced program that includes facilities, medium scale initiatives, and small-scale initiatives. Maintaining this balance is a challenge at the current level of funding."

Transitions in AST Techniques

- Solar physics
  - DKIST is the first new AST solar observatory since ~1970.
  - Moving to combination of routine solar disk monitoring with investigations at fundamental length scale on Sun
- Night-time OIR astronomy
  - Concluding transition from era of multi-user 2-4m telescopes
  - Multi-user 6-10m telescopes, plus telescopes primarily dedicated to one or a few large projects and data sets
- Radio astronomy
  - Concluding transition from single-dish telescopes with limited angular resolution to versatile interferometers with arcsecond and subarcsecond imaging capability
- Each transition takes decades to occur
- Transitions track science and facility recommendations in decadal surveys

AST Facility Portfolio

- Portfolio Review Committee was commissioned in 2011 as broadly representative subcommittee of MPS Advisory Committee
- Portfolio Review Committee reported out in August 2012
  - Recommended a balance of small, medium and large programs that would require divestment of a number of operating telescopes from AST budget
- Community Advice, including both from *this committee* and the National Academies Midterm Assessment of the decadal survey recommended (using the words of the *this committee*) that "Strong efforts by NSF for facility divestment should continue as fast as is practical."

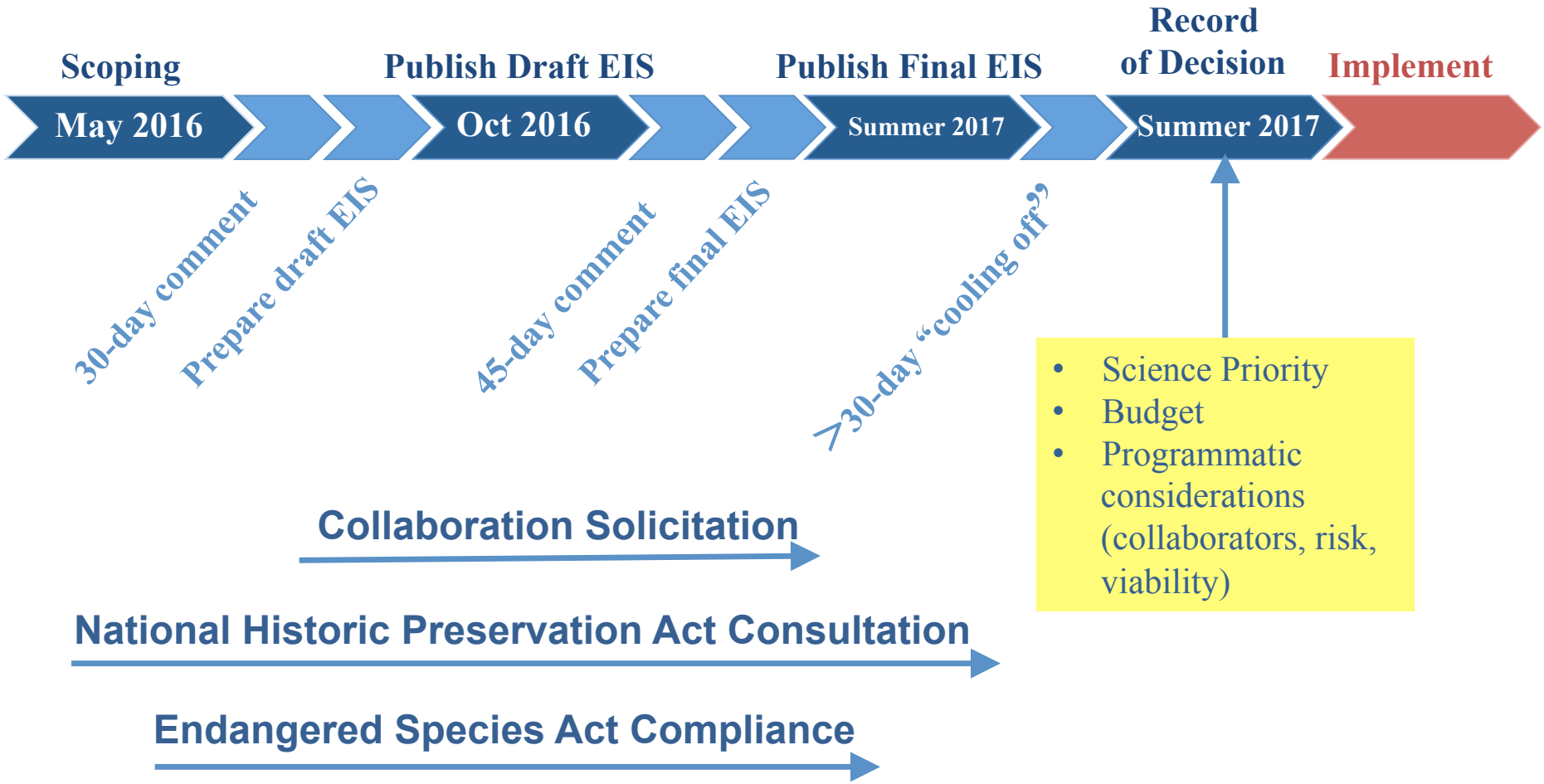
What Does "Divestment" Mean?

- The recommendations of the Portfolio Review Committee solely referred to removal of the funding of telescopes from the NSF/AST budget.
- Telescopes recommended for divestment are still important, and in some cases unique assets for astronomical research or other related uses.
- Hence the preferred divestment alternative, pursued vigorously by NSF since 2012, has been to find funding collaborations that enable some continued availability of NSF telescope assets for the research community.

Divestment Summary

Telescope	Status
KPNO 2.1m	Caltech-led consortium (Robo-AO) operating for FY 2016-2018.
Mayall 4m	Slated for DESI; bridge from NSF to DOE; NSF/DOE MOU for transition.
WIYN 3.5m	NOAO share to NASA-NSF Exoplanet Observational Research Program; NSF/NASA MOU in place; NASA instrument selected.
GBO	~25% collaboration for basic scope; started Environ. Impact Statement (EIS) process on October 19. DEIS under prep
LBO/VLBA	Separation from NRAO in FY 2017; MOA with US Navy in place for 50%.
McMath-Pierce	No obvious partner opportunities; very small user community.
GONG/SOLIS	SOLIS is off Kitt Peak; GONG refurbishment; Interagency Agreement with NOAA signed (NOAA sharing GONG operations costs).
Sacramento Pk.	University consortium in development, and NSF funded NMSU for transition to consortium; started EIS process; completion in 2017.
Arecibo	Formal EIS process under way, and issuance of Record of Decision targeted for 2017. Draft EIS released October 28. Final EIS under prep.
SOAR	Post-2020 status to be reviewed.

Target Dates for Arecibo Environmental Impact Statement (EIS)



Sac Peak and Green Bank are on similar paths, 2-6 months behind Arecibo.

Arecibo Solicitation

- Released: Wednesday January 25, 2017
- Proposals Due: Tuesday April 25, 2017
- Requires outside funding:
  - NSF Funding profile:
  - NASA to continue at current levels

Project Year	FY	NSF		
		MPS/AST	GEO/AGS	TOTAL
1	18/19	$3,600,000	$3,550,000	**$7,150,000**
2	19/20	$2,500,000	$2,500,000	**$5,000,000**
3	20/21	$1,750,000	$1,750,000	**$3,500,000**
4	21/22	$1,250,000	$1,250,000	**$2,500,000**
5	22/23	$1,000,000	$1,000,000	**$2,000,000**

- Financial Viability is a major evaluation factor
- Title transfer will be considered

National Center for Optical-Infrared Astronomy (NCOA)

In the beginning – Guiding Principles

In October 2015, NSF presented guidance to AURA on planning for LSST operations with the guiding principle

- ***A close synergistic relationship between NOAO and LSST would serve to optimize operational efficiencies, management efficiencies, and scientific productivity, and would thus be of maximal benefit to the scientific user community and a cost effective benefit to the US public.***

When it was known that Gemini would be managed by AURA (March 2016), it became clear to NSF and AURA that Gemini Observatory would also have many similar benefits of being closely connected to the same administrative framework.

From these beginnings NSF is proceeding to

- Develop a strategy for NSF-funded OIR capabilities to serve as the core of the U.S. OIR System in the era of LSST.

- Implemented through reorganization of NSF-funded OIR capabilities to:

  Integrate the operational entities of Gemini Observatory, LSST operations, and the National Optical Astronomy Observatory (NOAO) under an umbrella administrative framework which is managed and operated by a single managing organization.

  - National Center for Optical-Infrared Astronomy (NCOA)
    - » Working name, subject to change

- Why NCOA?
  - AURA presentation later in this meeting

NCOA

In *Guidance to AURA on Planning for the National Center for Optical-Infrared Astronomy,* NSF stipulated Purpose, Mission, Scope, and managing organization responsibilities, and provided guidance on budgets (Sep 2016).

- **Purpose:** To be the U.S. national center for ground-based optical and infrared (OIR) astronomy; to operate and maintain OIR observational research facilities and related data systems; to coordinate and integrate observational, technical, and data-oriented capabilities available throughout the U.S. OIR System of federal and non-federal assets; to initiate, develop, and sustain domestic and international collaborations and partnerships to advance ground-based OIR facilities and capabilities.

- **Mission**: Enable discovery in ground-based optical and infrared (OIR) astronomy.

- Note: Gemini Observatory and LSST have their own mission statements as specified by their governing bodies.

Charge to AURA

- Define organizational structure to comply with:
  - Vision for NCOA to serve as the core of the U.S. OIR System,

  as well as

  - rights and needs of partners in Gemini Observatory and LSST.

- Describe and implement management and operations approaches
  - that comply with Purpose, Mission, Scope, and managing organization responsibilities, and budget guidance in the guidance document.

AURA deliverables

- Plan for the Organization, Management, and Operation of NCOA (NCOA Plan).
- Transition/Implementation Plan describing evolution of existing and planned elements of LSST, Gemini Observatory, and NOAO under an umbrella administrative framework (NCOA) managed and operated by AURA.

- Note: LSST and Gemini Observatory will have their own planning and reporting requirements as described in their governance and funding documents