New Coordinated Astrophysics Technology Gap Solicitation, Prioritization, and Reporting

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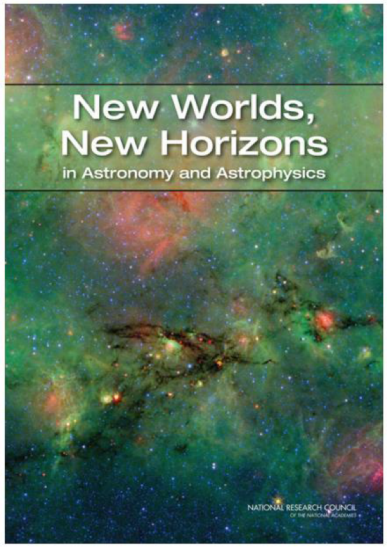
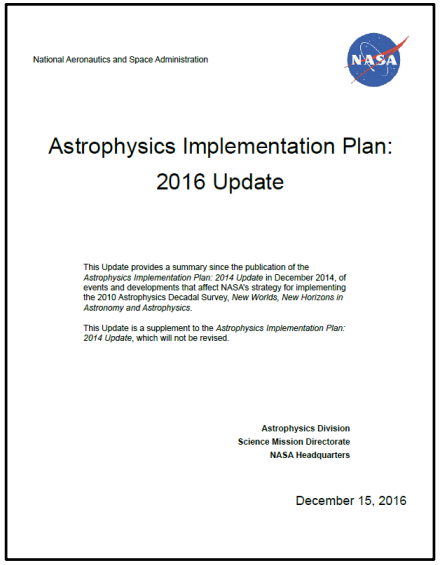
APD Technology Development

- **APD aims to mature technology for future strategic missions with input from the science and technical community**



2010 Decadal Survey


National Aeronautics and Space Administration

Astrophysics Implementation Plan:
2016 Update

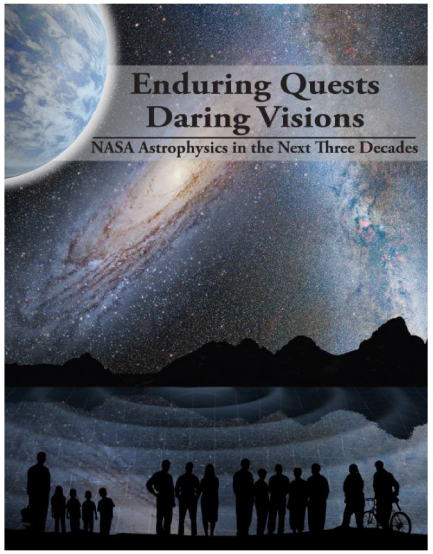
This Update provides a summary since the publication of the *Astrophysics Implementation Plan: 2014 Update* in December 2014, of events and developments that affect NASA's strategy for implementing the 2010 Astrophysics Decadal Survey, *New Worlds, New Horizons in Astronomy and Astrophysics*.

This Update is a supplement to the *Astrophysics Implementation Plan: 2014 Update*, which will not be revised.

Astrophysics Division
Science Mission Directorate
NASA Headquarters

December 15, 2016

APD Implementation Plan
(2012, 2014, 2016)



NASA APD
30 year vision (2013)

- **Technology gaps have been solicited and prioritized annually to inform APD strategic technology investments**
- **This process is managed by APD Program Technologists in the Physics of the Cosmos (PCOS), Cosmic Origins (COR), and Exoplanet Exploration (ExEP) Program Offices**

Introduction

Earlier this year, at the request of the APD Director, the Program Offices looked into:

- Improved coordination between the three POs in soliciting technology gaps from the community, prioritizing them, and publishing the results to improve APD's ability to:
  - Promote technology innovation
  - Reduce life-cycle cost of technology developments
  - Motivate technology cross-utilization
  - Inform the community of NASA Astrophysics strategic technology directions
- Consolidated and streamlined efforts in light of the mostly multi-year timescales of technology developments.

Implementation Plan

The following changes have been approved for implementation:

- Joint solicitation of technology gaps from the community:
  - The three POs will jointly coordinate the next technology gap solicitation, prioritization, and reporting cycle, and carry it out on the same schedule
  - This cycle will now be a biennial process (every other year, **starting in 2019**)
  - POs will collect gaps together and determine which program carries each gap
- Coordinated prioritization of the technology gaps:
  - Same prioritization criteria and scoring metrics will be used by all POs
  - Joint listing of all prioritized gaps will be published every other year
- Reporting on the technology gaps:
  - Joint publication will be called the "Astrophysics Biennial Technology Report" or "ABTR" (no more Program Annual Technology Reports, PATRs)
  - The three POs host a common "AstroTech" database of all managed technology projects **http://www.astrostrategictech.us/**

Timeline of Coordinated APD Biennial Technology Cycle (1 of 2)

- **PCOS, COR, and ExEP PO technologists are jointly coordinating the details for the next technology gap prioritization cycle.**
- **PO technologists have communicated the new processes to our respective Program Analysis Groups (PAGs).**
  - Completed briefing PAG ECs on the new framework
  - A detailed description of the new process to be presented at the winter 2019 AAS joint PAG session
- **Starting in <u>January, 2019</u>, we will jointly solicit community technology gap input.**
- **The technology gap input window will close on <u>June 1, 2019</u> (same as in prior years for PCOS/COR). Technologists and Chief Scientists from all three POs will jointly decide which PO should carry each gap.**

Timeline of Coordinated APD Biennial Technology Cycle (2 of 2)

- **PCOS, COR, and ExEP POs will separately prioritize gaps by the end of August 2019, each using existing processes, though with a uniform set of criteria and scoring metrics, producing three prioritized program office gap lists.**
- **Criteria are under development, will include Strategic Alignment, Benefits and Impacts, Urgency, and Scope of Applicability**
- **Each of the three gap lists will be divided into four priority tiers (following current practice of PCOS and COR POs), and the three lists will be merged by tier into a single joint APD technology gap priority list.**
  - Tier 1 will only include gaps of the highest priority for APD, with no guaranteed representation for gaps from any Program
- **PO technologists will jointly create the ABTR, which will include the combined prioritization list, with the first issue to be released in October 2019.**
- **APD will have one integrated SAT proposal call for all three science themes, with the same annual solicitation cycle as before.**

ABTR – Covers PCOS, COR, and ExEP

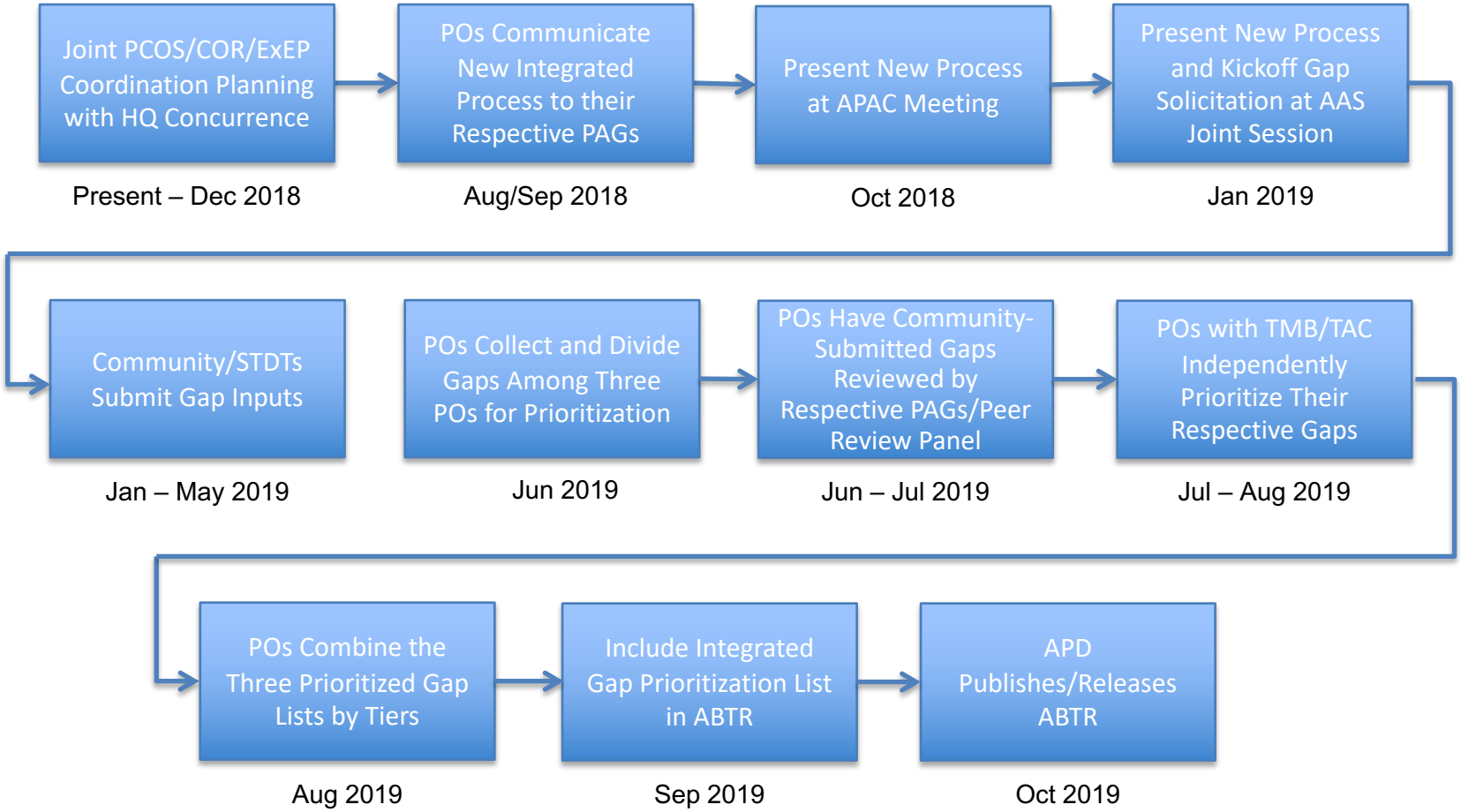
- **Concise, high-level, biennial report (~15-20 pages)**
- **Will include:**
  - News and technology development highlights across the three Programs
  - Joint list of technology gaps by priority tier with links to full details on the Web
  - Current investment portfolios of the three Programs
  - Announcement of new technology awards across APD

Summary

- APD is switching to an integrated technology gap solicitation, prioritization, and reporting process along with a common publicly accessible technology database, kicking off in January 2019
- An executive-summary-level document, the Astrophysics Biennial Technology Report (ABTR), will be published every other year representing all three POs.
- SAT proposal call will also be integrated without changing its annual solicitation cycle.
- These integrated and uniform practices are intended to streamline our processes, reduce effort, increase transparency, and create synergy between the POs. We will refine/adjust the process as needed – especially in light of future recommendations from the Astronomy and Astrophysics 2020 Decadal Survey.

Additional Info

Schedule for Implementing New Coordinated Process



Strategic Astrophysics Missions

- Strategic astrophysics missions are ones NASA Astrophysics Division is developing, participating in, or interested in, to respond to high-priority science questions or mandate. These are missions identified as priorities by the current Decadal Survey; identified for execution by the Astrophysics Division; and/or that inspired broad community interest, e.g. as captured in the Astrophysics Roadmap. These missions are not competed or PI-led, though they may carry competed instruments developed by PI-led teams.
- Current strategic missions:
  - Missions in formulation or implementation: JWST, WFIRST, Euclid
  - Decadal survey mission concept studies: HabEx, OST, LUVOIR, and Lynx
  - Missions identified for potential contributions: LISA, Athena
  - SOFIA
  - CMB Polarization Surveyor per Roadmap: Inflation Probe
  - Visionary missions per Roadmap: Gravitational Wave Mapper, Cosmic Dawn Mapper, ExoEarth Mapper, Black Hole Mapper

Strategic Technology Gaps

- The three Program Offices, PCOS, COR, and ExEP, biennially prioritize strategic technology gaps for APD. The resulting Astrophysics technology gaps list is intended to inform APD's technology investments. To make this gap list most useful to APD, we do not include gaps relevant for approved missions or existing APD technology development initiatives. For this reason we exclude technology gaps from the following strategic missions or technology initiative:
  - JWST
  - WFIRST
  - Athena
  - LISA
  - Starshade technology activity

Uniform Prioritization Criteria

- **Proposed criteria and metrics:**
  - ***Strategic Alignment:*** How well does the technology align with astrophysics science and/or programmatic priorities set out in the Astrophysics Implementation Plan, Decadal Survey, or Astrophysics Roadmap? Ruling out a gap as non-strategic done by TMB with input from PAGs; communicating non-strategic but relevant gaps is beneficial to such organizations as STMD, OCT, APRA proposers/tech developers
  - ***Benefits and Impacts:*** How much impact does the technology have on applicable missions? To what degree does it enable and/or enhance achievable science objectives, reduce cost, and/or reduce mission risks?
  - ***Urgency:*** Given the anticipated difficulty of maturing from current TRL of a full solution to TRL 5, assessed against the time available until anticipated launch and/or other schedule drivers, how urgently does the gap need to be addressed?
  - ***Scope of Applicability:*** How crosscutting is the technology? How many Astrophysics programs and/or mission concepts would it benefit?
- **The TMB/TAC of each PO will finalize their Program's gap prioritization.**
- **Technologists and Chief Scientists from all three POs participate in all three POs' prioritization meetings, helping provide uniform scoring.**

Definition of Gap Priority Tiers

- **Priority Tier 1:** Technologies determined to be of the highest interest to APD. Advancing these key technologies is judged as most critical to making substantive near-term progress on the highest-priority strategic astrophysics missions. The POs recommend SAT calls and award decisions address these technology gaps first.
- **Priority Tier 2:** Typically, technologies thought to be highly desirable or desirable for a variety of strategic missions. The POs recommend that, should sufficient funding be available, SAT calls and award decisions address closing these technology gaps as well.
- **Priority Tier 3:** Technologies the POs deem supportive of APD objectives, but scoring lower than Priority 1 and 2 technology gaps.
- **Priority Tier 4:** Gaps that the POs deem legitimate APD technology gaps, but that are not currently aligned with any strategic mission. These gaps will not be reprioritized in following years. The relevant PO will contact submitters of such gaps to inform them of what happened, why, and what changes are needed before their gap can be resubmitted.