



MAST
Users
Group
Meeting

Jan
14-15
2016

Introduction and Highlights

Karen Levay

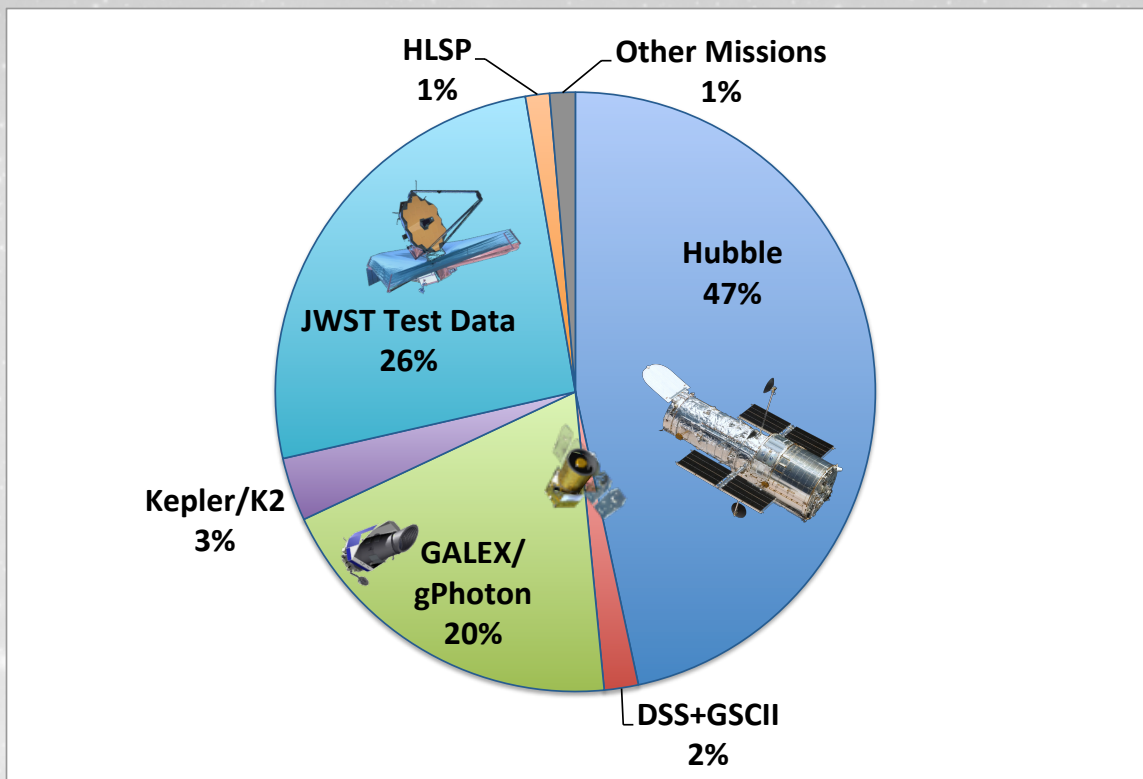
Rick White



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MAST Data



MAST Holdings

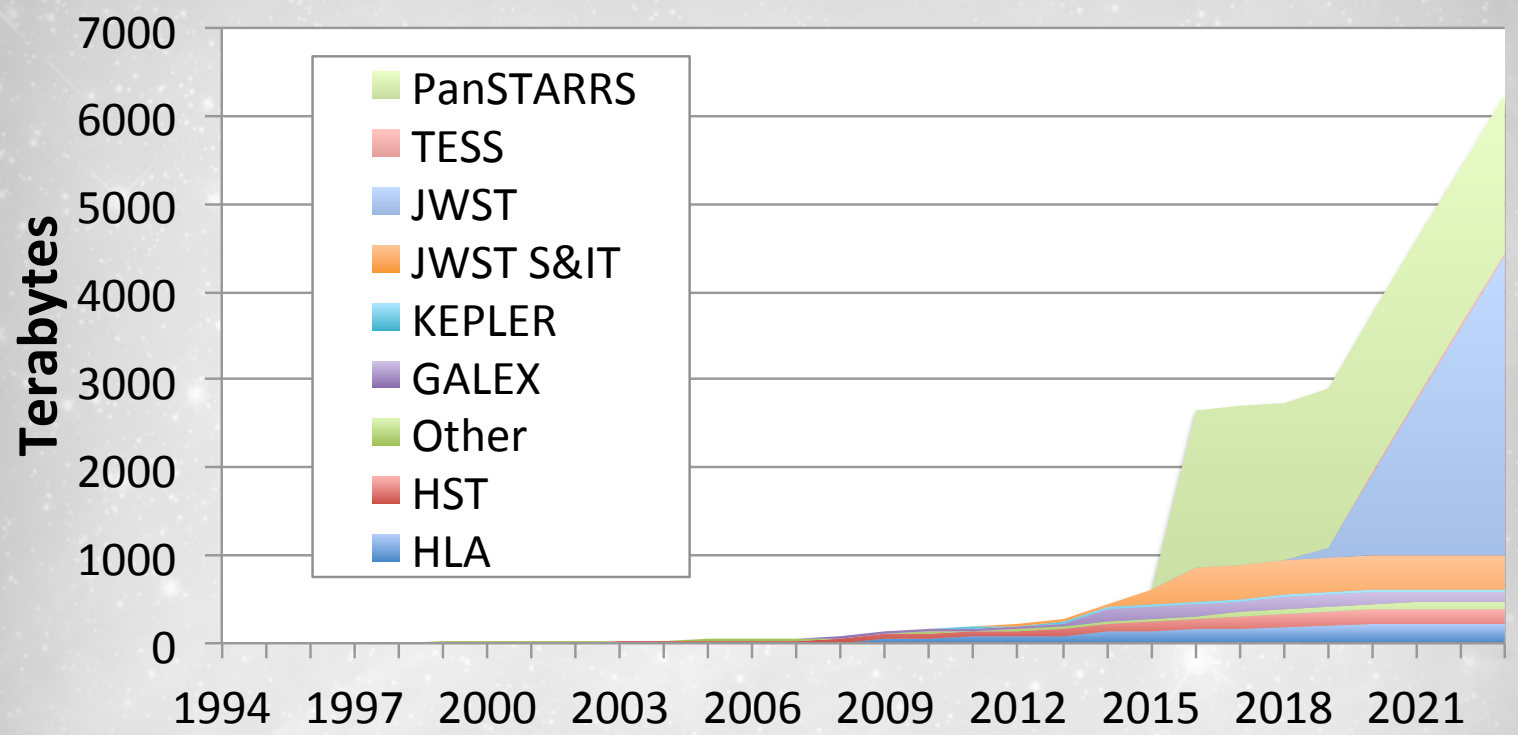
- 21 missions/projects (current and planned)
- Over 662 TB of data (Jan 1, 2016)
- After addition of Pan-STARRS the archives at STScI will be > 2.5 PB



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Projected Archive Growth



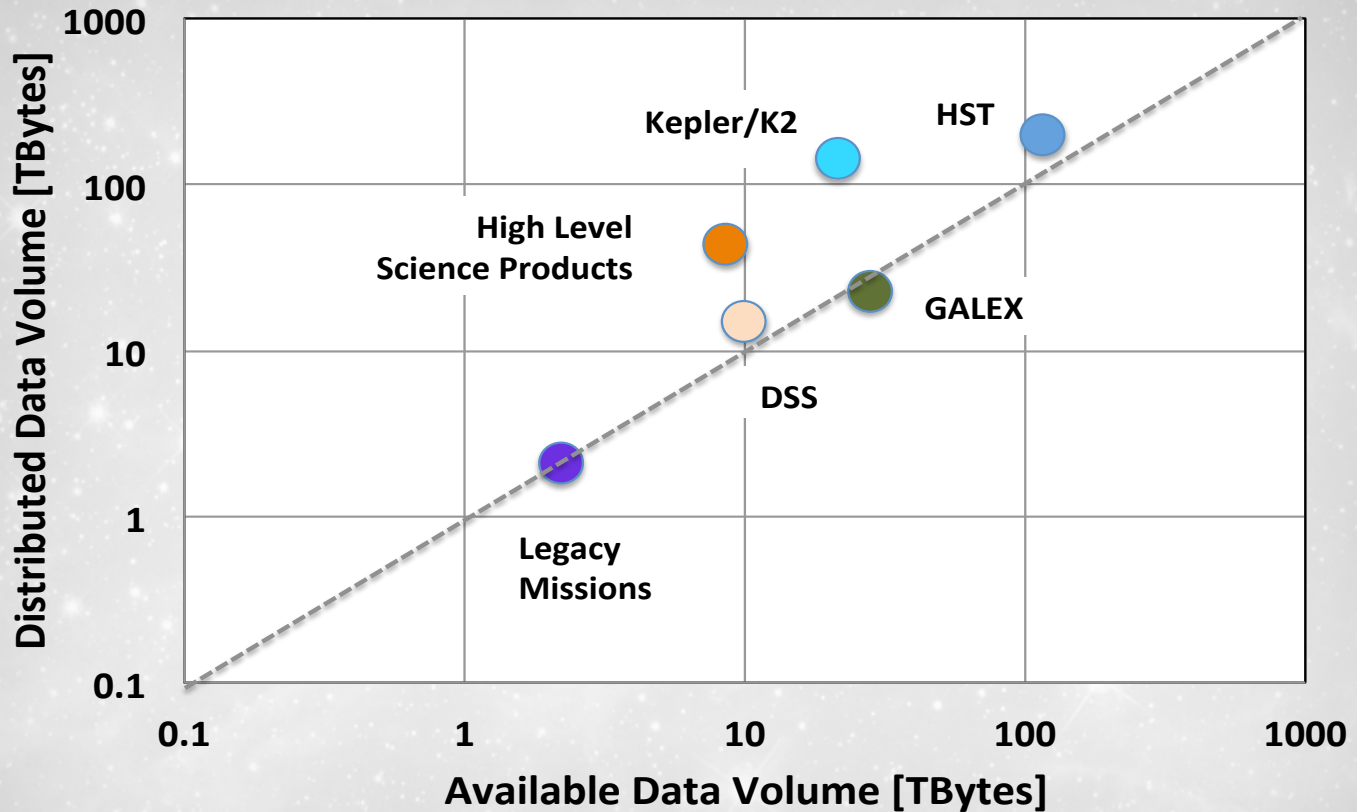
NOTE: PanSTARRS is science funded.



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Distribution vs Holdings



Volumes as of Jan 1, 2016

Downloads from Nov 2013 – Dec 2015

Downloads do not include gPhoton or any
catalog searches

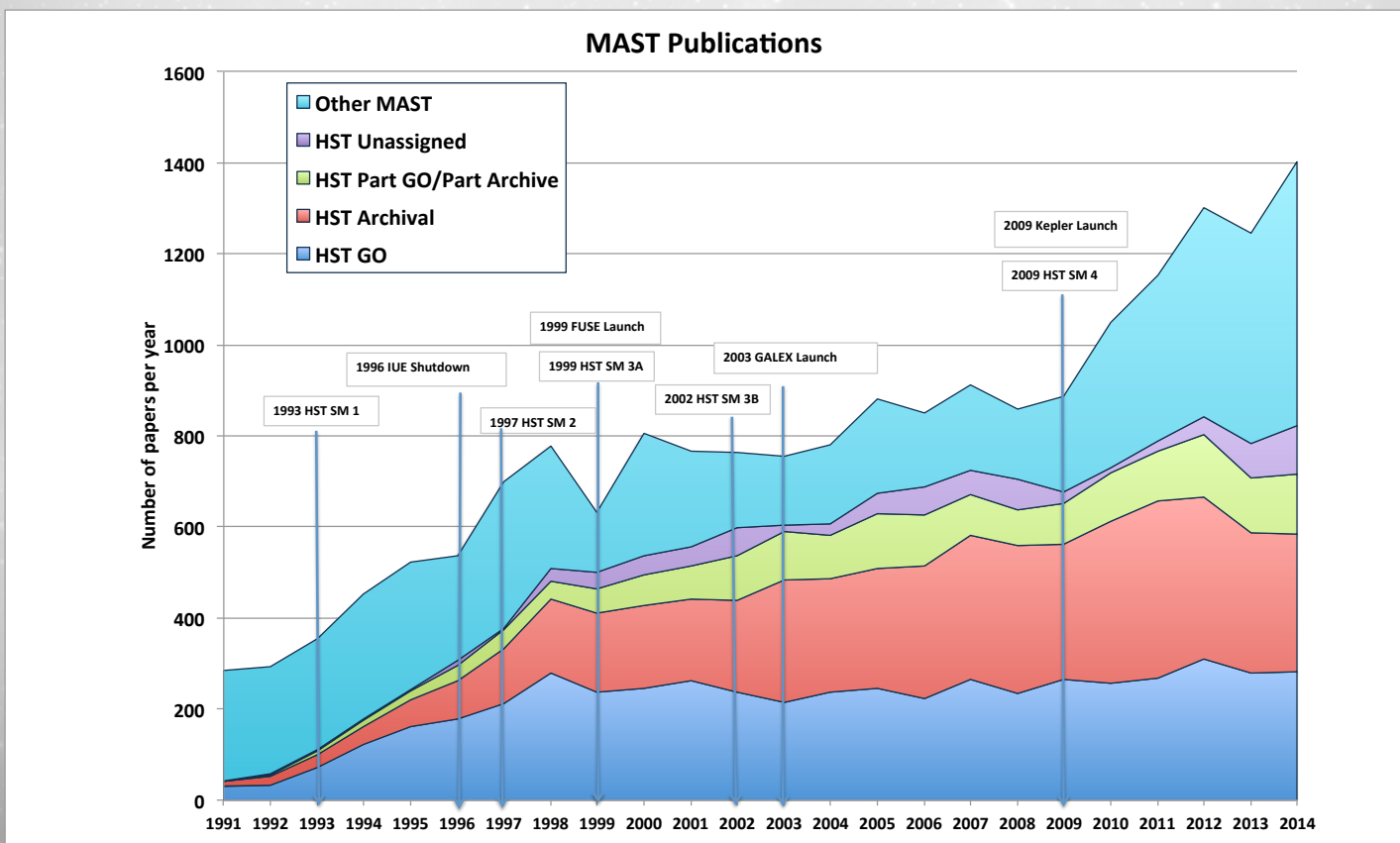


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Publications

- MAST continues to identify papers using data for most of the MAST missions. Identification of 2015 papers is not complete.





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Archive Funding Sources

- Missions
 - HST
 - JWST
 - Kepler
 - TESS
- MAST** – NASA archive funding
 - Includes VO component
 - Includes HLA
 - Includes HLSP ingest
- PanSTARRS – DDRF (science)
 - Working on obtaining operational funding

**MAST funding supports the MUG meeting





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Archive “Programmatic Review”

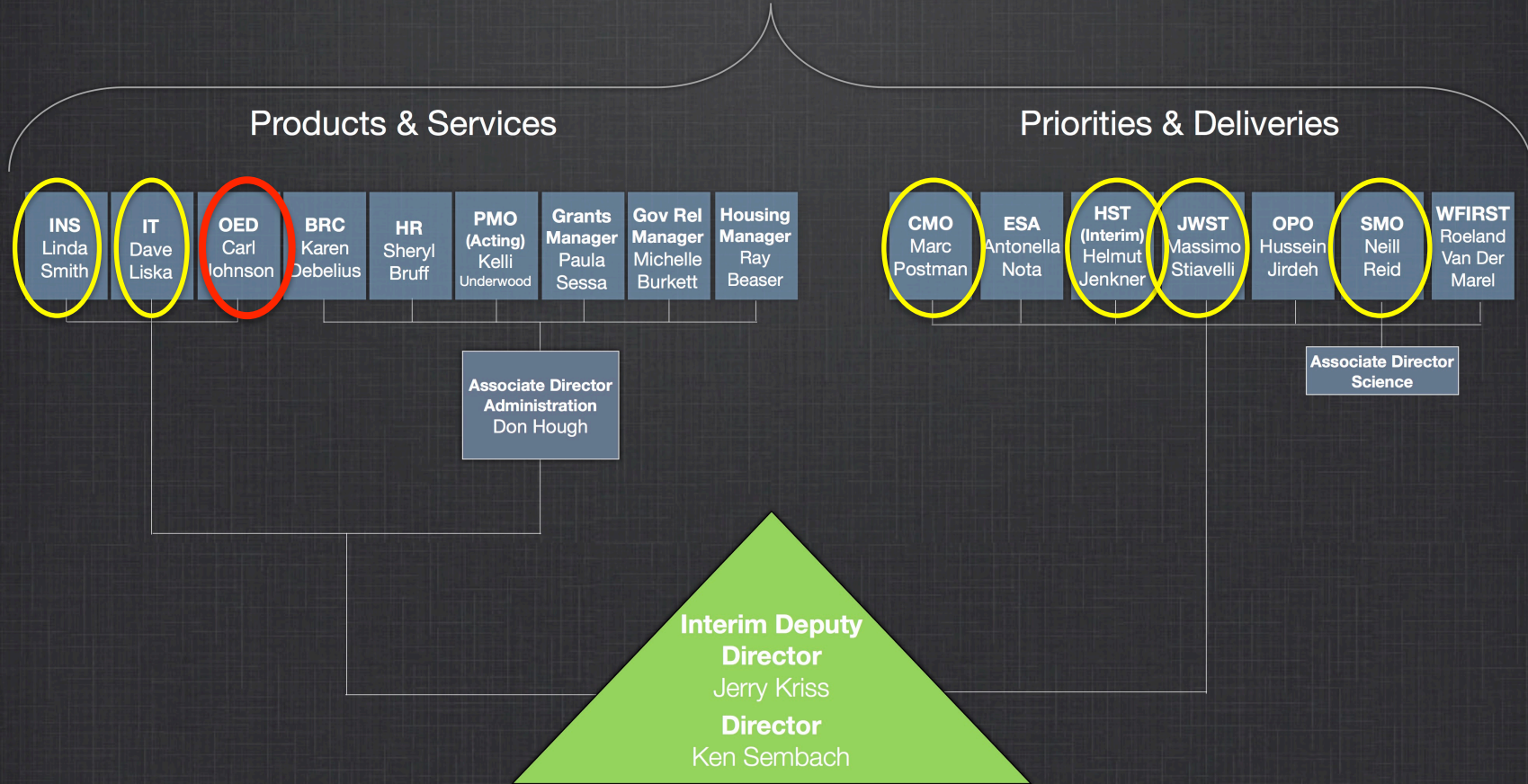
- Programmatic Review held in spring of 2015
- Review did not include HST, JWST or Kepler operations
- MAST received an “Excellent” evaluation
- MAST described as “the archive with the most innovation and a vision for the future”.
- Next programmatic review is likely in 2018 or 2019 (schedule has varied in the past)
- MAST funds ~ 10 FTEs – includes Virtual Observatory and HLA funding



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Space Telescope Science Institute A Team of Teams



Wednesday, November 4, 15

- Archive team is mostly part of the Operations and Engineering Division (OED)
- Team works closely with INS and IT divisions
- Direction, priorities and requirements from the mission offices (HST, JWST, CM, and SMO)



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Archive Organization

Operations & Engineering Division
Carl Johnson
Alessandra Aloisi
Tony Krueger
Rick White
Chief Engineer (vacant)
Mark Kyprianou/ Anastasia Alexov
(JWST DMS Leads)

Science Software Branch (SSB)
Warren Hack acting – 24 members + 2 openings
Data analysis tools such as AstroLib, PyRAF & STSDAS and calibration software included in the JWST and HST calibration pipelines

Data Systems Branch (DSB)
David Wolfe acting- 21 members + opening
Development, integration and testing of HST/JWST/Kepler processing pipelines, archive, distribution processes

Data Processing and Operations Branch (DPAS)
Faith Abney - 12 members + opening
Operations for HST/JWST/Kepler data processing pipelines and distribution

Archive Sciences Branch (ASB)
Karen Levay - 23 members + 3 openings
“MAST” archiving; Distribution; Interface development for all Missions/ Datasets; Bibliography support; VO work; HLSP

HLA Project
Lee Quick
Rick White

HSC Project
Brad Whitmore

The HLA is a cross-branch/divisional project. The HSC is run from the HST mission office



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HST

- HST Mission Office gathers proposed projects and resource estimates from INS and archive teams
 - Prioritizes and authorizes work based on budget and importance.
- Teams work together to enhance the processing pipelines
 - **INS** leads and manages work to define calibration and processing algorithms and processes and to define new products
 - **SSB** works with INS teams to implement the improved or new calibration algorithms into the calibration software for users and for the pipeline
 - **DSB** hosts biweekly pipeline meetings with SSB and Instrument leads attending to plan releases, implementation issues and testing results. Representatives from all archive branches attend this meeting.
- Archive team
 - Works with science staff to research and proposes new methods for science data processing workflows, archiving, database, interfaces, improvements to products.

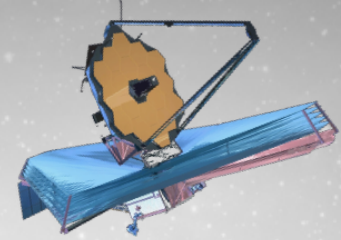




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JWST



- JWST in active development for every subsystem. Thousands of requirements defined across all subsystems. All tracked by JWST Mission Office.
- Data Management Systems (DMS) requirements tracked at mission office and within the archive team
- SEB reps coordinate communication between subsystems and Integration and Test (I&T). There is a SOC Integration lead.
- Many meetings weekly to coordinate all JWST activities. Managers and Team Leads are active participants in these meetings.
- Subsystems interfaces have already been defined and now being refined as part of the development effort
- DMS meetings include INS representatives
- SSB staff meets with instrument leads for calibration and related work



TESS, Kepler/K2 & “MAST”



- Community Mission Office (CMO) is responsible for Kepler/K2 and TESS
- Kepler/K2
- TESS
- MAST
 - Archive work for NASA missions at STScI other than HST, JWST, Kepler, TESS covered under MAST funding.
 - Virtual Observatory funding under MAST
 - Work priorities set by MAST PI (R. White) and archive team



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External Contacts and Collaborators

- NASA Headquarters (for MAST)
 - Monthly updates
 - Reviews
- ADEC – A collaboration with NASA archive centers including MAST, HEASARC, IRSA, ADS, HST, Chandra, Spitzer -
 - Monthly telecons
- NAVO – NASA Archive Virtual Observatory
 - Monthly coordination telecons
 - Weekly operational telecons
 - Deputy chairs for 2 IVOA working groups (T. Donaldson, T. Dower)
- CADC – Canadian Astronomy Data Centre (HST)
 - Monthly telecon
 - Yearly face to face
- ESAC – European Space Astronomy Centre (HST)
 - Monthly telecon
 - Yearly face to face
 - ESA office at STScI (A. Nota)



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Highlights with details later

- HST Instrument plans (*Sabbi/Oliveria/Grogin*)
- JWST DMS activity (*Valenti/Kyprianou*)
- HST Spectral Legacy Archive (*Tumlinson*)
- Hubble Legacy Archive and Hubble Source Catalog (*White/Whitmore*)
- Kepler / K2 (*Fleming*)
- GALEX (*Fleming*)
- PanSTARRS (*White*)
- Linking Data and Publications (*Peek*)
- Big Data Science Definition Team Report (*Postman*)
- MAST Portal (*Donaldson/Rogers/Wallace*)
- High-Level Science Products (HLSP) (*Fleming*)
- Documentation handling and website redesign (*Weissman/Fleming*)



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Single Sign-On

- Successfully deployed by the archive April 13, 2015
- Transitioned ~ 500 external users to new system. Other users to sign up for new accounts.
- Implementation was smooth with few problems
- Some users unhappy about losing account after decades and the length requirement of the new password
- See presentation made to the STUC April 17 in supplemental materials.

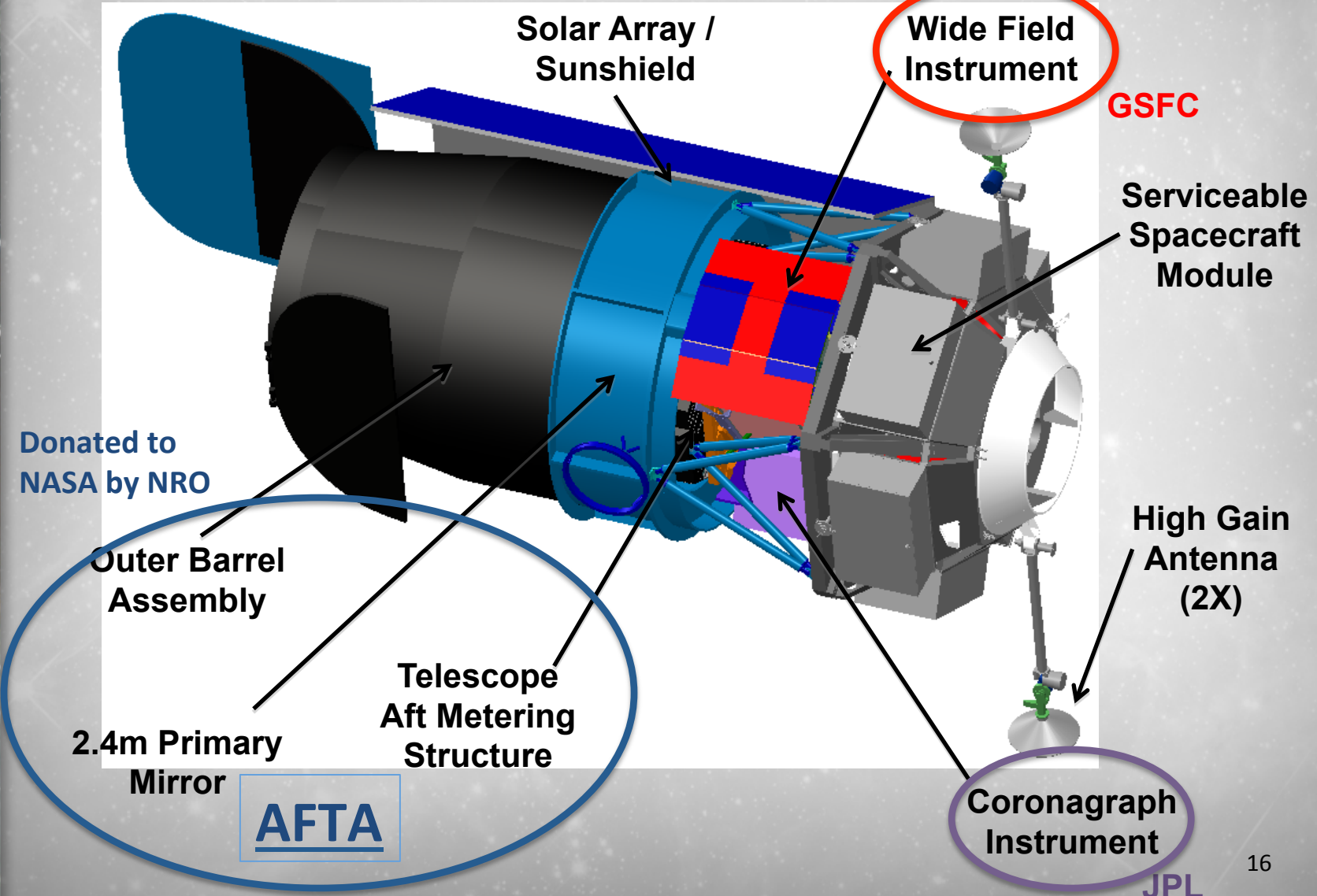


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WFIRST Observatory

(Wide Field Infrared Survey Telescope)





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WFIRST Science

*Highest ranked large space mission
in ASTRO2010 decadal survey
(100x HST FOV)*

Complements Euclid

- Determine the nature of the dark energy that is driving the current accelerating expansion of the universe
- Survey the NIR sky
- Perform statistical census of planetary systems through a microlensing survey
- Provide the community with a wide field telescope for pointed wide observations (i.e., a GO program!)
- Characterize nearby exoplanets and planetary disks using onboard coronagraph

HLS: 2.0 yrs
SNS: 0.6 yrs

**BARYON ACOUSTIC
OSCILLATIONS**

**DARK
ENERGY**

**GRAVITATIONAL
LENSING**

**LEGACY SCIENCE
SURVEYS**

**GUEST
INVESTIGATOR
PROGRAM
(AR)**

*complements
LSST*

SUPERNOVAE

GENERAL ASTROPHYSICS

**MICROLENSING
CENSUS**

1.0 yrs

EXOPLANETS

CORONAGRAPHY

1.0 yrs

**GUEST
OBSERVER
PROGRAM
(GO)**

1.4 yrs

*continues
Great
Observatory
legacy*

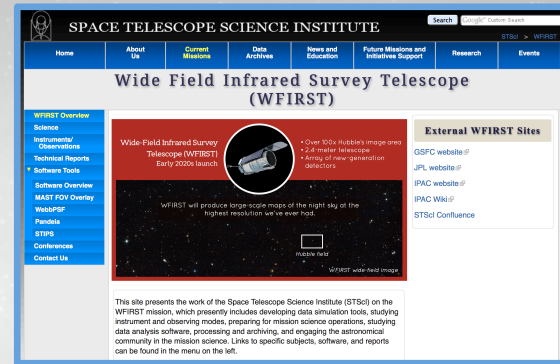


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WFIRST Science Operations

- STScI has been funded since 2014 for WFIRST pre-formulation work
 - Website contains info, reports, software,
- NASA Headquarters has decided (Nov 2015) that GSFC will manage WFIRST Science Operations, with most actual work directed to STScI and IPAC
- Details of STScI work package for formulation (Phase A+B) being developed will include work on the WFIRST Archive
 - Phase A activities (2016-2017) to include development of the archive requirements and concept.
 - Will leverage existing MAST infrastructure and STScI expertise to the extent possible
 - Will include advice and input from WFIRST Project, WFIRST Science Working Group, and WFIRST Archival Science Investigation Team (Szalay et al.)



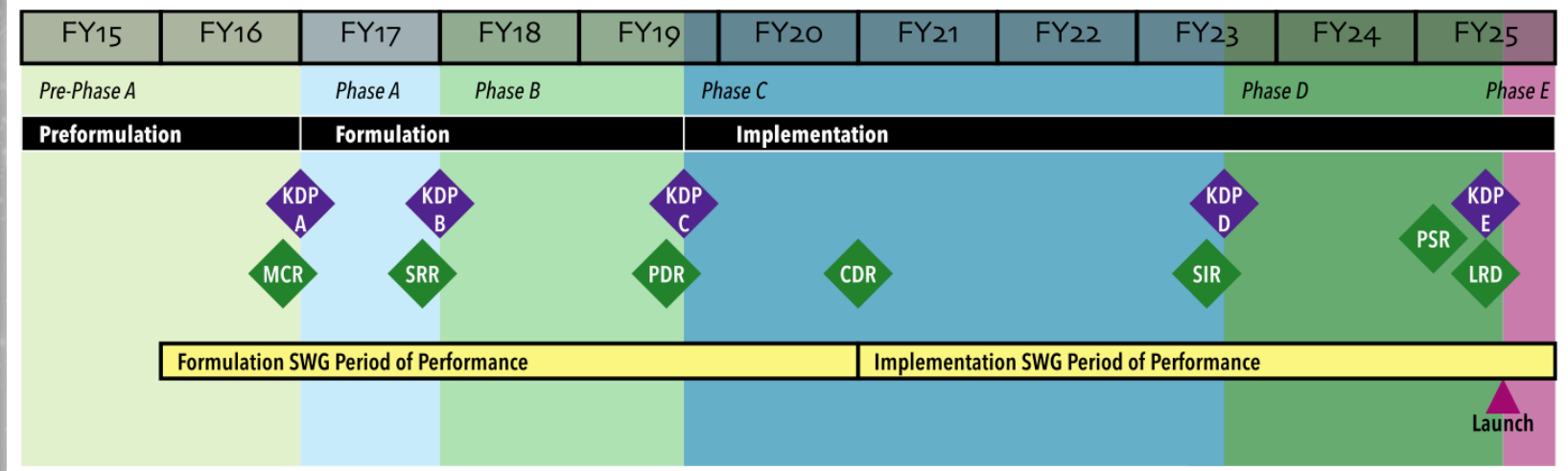


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WFIRST Mission Timeline

(somewhat outdated)



Note:

- Mission Concept Review passed Dec 8+9, 2015
- Science Team selections expected any time now
- Phase A may start Feb 2016, pending NASA HQ decision
- Timeline and launch date (~2025) uncertain due to budget
 - Projected Mission cost ~\$2.5B
 - Consistent with Astro2010, when corrected for inflation



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Gaia and Astrometry Improvements

- STScI defined as a Gaia “affiliated data center”
- We will receive Gaia data as soon as possible after each release with no proprietary period.
- Plan to use Gaia astrometry to improve Guide Star Catalog
- Study to improve the astrometry for all HST data



Gaia Schedule for 2016

- Jan/Feb – update data reader/DB ingestion code when the final catalog data model is available.
- Apr/May – develop GAIA/GSC2 object match and astrometry update code
- Aug/Sep – download GAIA first data release and load DB
- Oct-Dec – perform GSC2 updates using GAIA astrometry.



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Survey summary

- Survey results in supplementary material



STScI Bandwidth

- STScI's Internet 2 (I2) connection was disconnected in July 2014.
 - Improved “commercial” side of bandwidth
 - Significant impact to I2 users specifically CADC
- I2 reconnected on Dec 19
 - Direct connection to the MAXGigaPop
 - Seeing significant improvements to CADC
 - Still evaluating effect on other I2 institutions



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MUG Report

- Due to press of work and the late receipt of the MUG report, we have not addressed the recommendations included in that report in time for this MUG meeting.