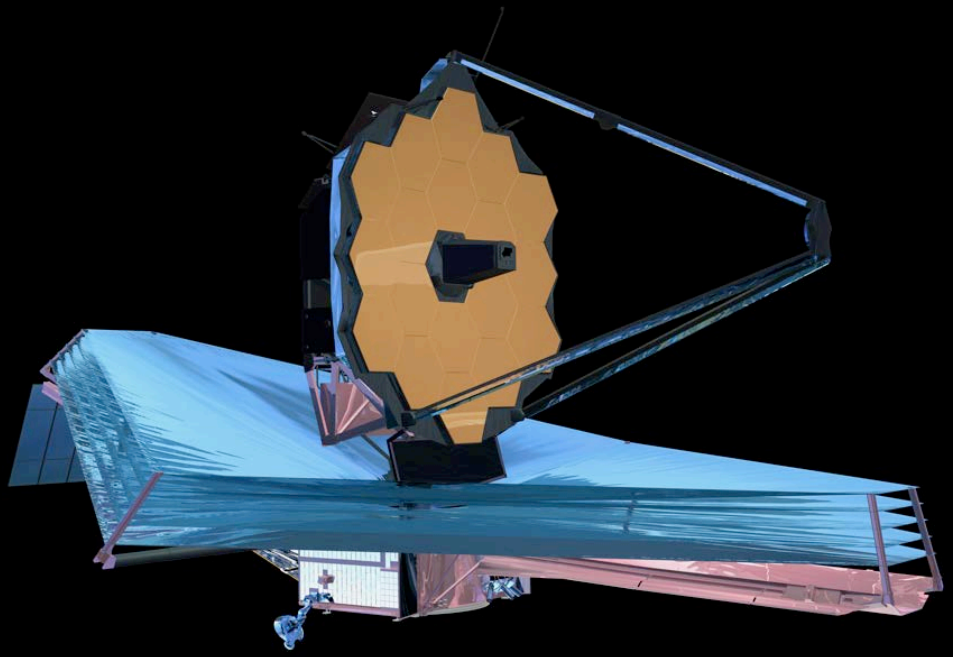
JWST Science Policies



Neill Reid – Science Mission Office, STScI
Science policies: Janice Lee, Jennifer Lotz, Amaya Moro-Martín, Lou Strolger (SMO); Nikole Lewis (JWSTMO)

Context

- Our charge at STScI is to maximise the scientific return of the missions we operate
- JWST epitomises international co-operation as one of the largest science programs ever undertaken, worldwide.
  - We (STScI and the community) need to make JWST correspondingly productive
- JWST is an incredibly powerful machine with broad scientific reach and complex instrumentation, a 5-year lifetime requirement, 10-year goal
  - Exploiting that power requires an informed community
  - Providing early access to data from representative science programs is crucial to understanding JWST's capabilities and enabling the community to maximise the science return.

JWST Advisory Committee

(est. 2009)

Roberto Abraham (Toronto)
Neta Bahcall (Princeton)
Stefi Baum (Rochester)
Roger Brissenden (Chandra/SAO)
Hashima Hasan (NASA, ex-officio)
Tim Heckman (Johns Hopkins)
Garth Illingworth (Santa Cruz, Chair)
Malcolm Longair (Cavendish)
John Mather (NASA, ex-officio)
Mark McCaughrean (ESA, ex-officio)
Chris McKee (Berkeley)
Brad Peterson (Ohio State)
Alain Ouellet (CSA, ex-officio)
Joseph Rothenberg (JHR Consulting)
Sara Seager (MIT)
Eric Smith (NASA, ex-officio)
Lisa Storrie-Lombardi (Spitzer/Caltech)
Monica Tosi (Bologna)

JSTAC: *advisory to STScI Director*

Represents the Scientific Community

http://www.stsci.edu/jwst/advisory-committee

JWST Advisory Committee (2016)

Roberto Abraham (Toronto)
Neta Bahcall (Princeton)
Tommaso Treu (UCLA)
Roger Brissenden (Chandra/SAO)
Hashima Hasan (NASA, ex-officio)
Tim Heckman (Johns Hopkins)
Garth Illingworth (Santa Cruz, Chair)
Malcolm Longair (Cavendish)
John Mather (NASA, ex-officio)
Mark McCaughrean (ESA, ex-officio)
Chris McKee (Berkeley)
Kelsey Johnson (U. Virginia)
Alain Ouellet (CSA, ex-officio)
Heather Knutson (Caltech)
Natalie Batalha (Ames)
Eric Smith (NASA, ex-officio)
Lisa Storrie-Lombardi (Spitzer/Caltech)
Monica Tosi (Bologna)

JSTAC: *advisory to STScI Director*

Represents the Scientific Community

http://www.stsci.edu/jwst/advisory-committee

Outline

- Science timeline
  - Schedule developments
- HST & JWST in 2018
  - Structuring the TAC process
- JWST Early Release Science Program
  - Objectives and priorities
  - Proposal structure and format

JWST Science Planning Timeline

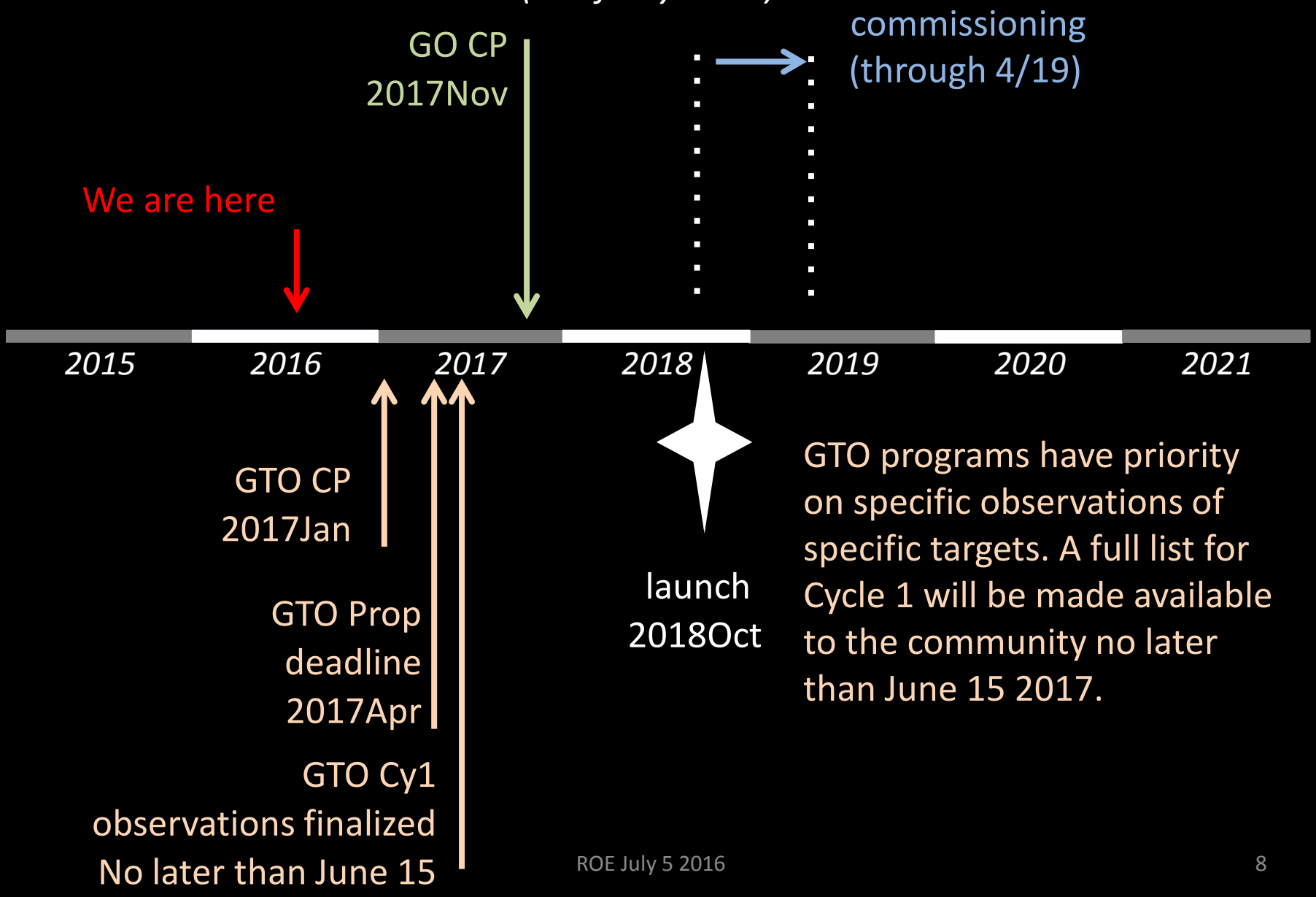
Background

JWST science planning timeline outlined at several previous meetings
- Review & highlight some updates
- See flyer & JWST web site for more details

JWST observing programs
- Guest Observer (GO programs)
  - Open access for the community
  - ~80% of time in Cycles 1 through 5
- Guaranteed Time Observer (GTO) programs
  - 4020 hours allocated over first 30 months (i.e. Cycles 1 through 3)
  - NASA policy constraints on time/cycle
- Director's Discretionary Time (DD) programs
  - Up to 10%/cycle i.e. ≤877 hours
  - Rapid response observations & targeted science programs, such as Early Release Science program

JWST Science Planning Timeline

(as of July 2016)



GTO programs have priority on specific observations of specific targets. A full list for Cycle 1 will be made available to the community no later than June 15 2017.

GTO proposal submission

GTO proposal submission deadline is April 1 2017

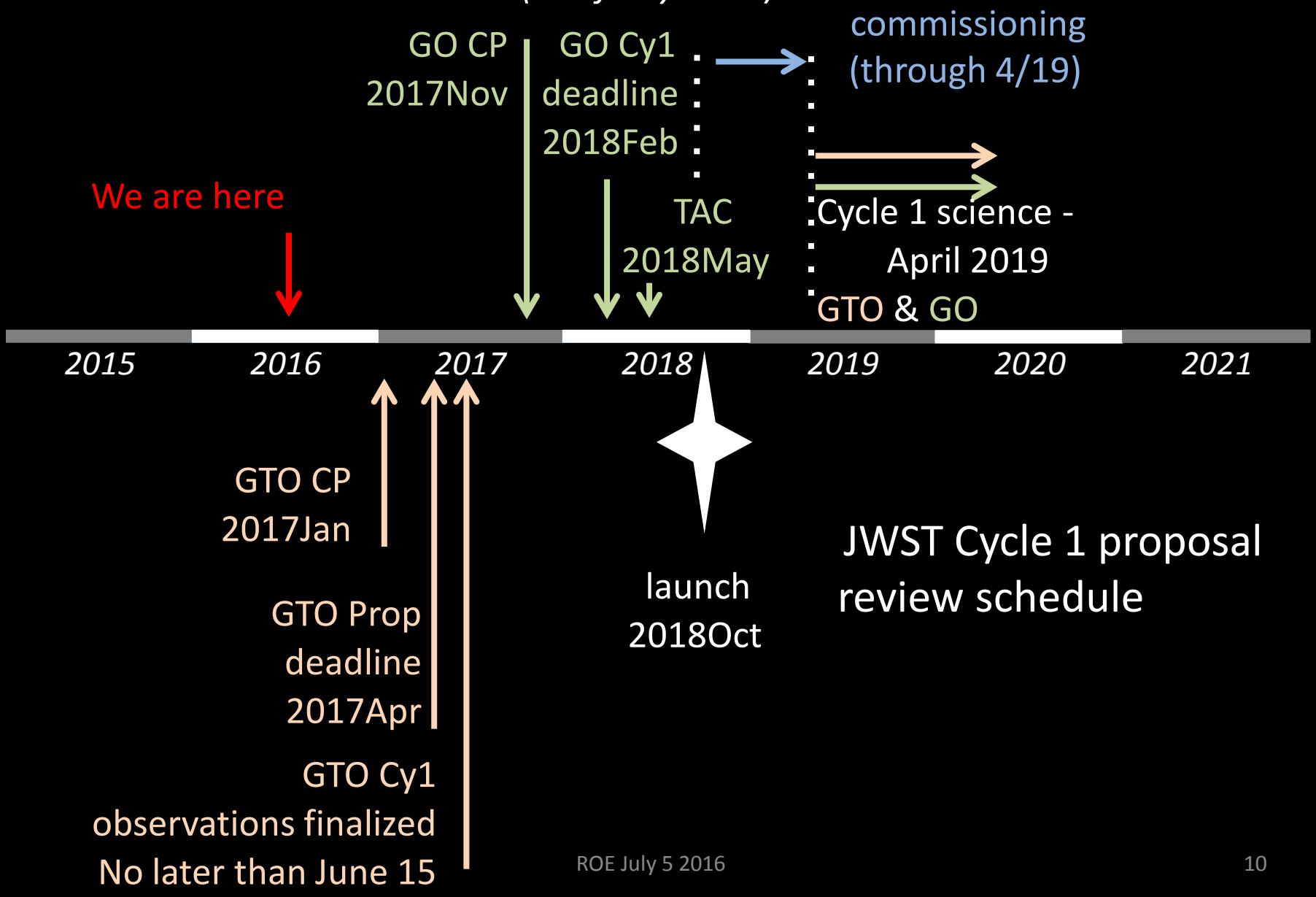
What happens between April 1 and June 15?

1. Consistency check with original proposals
   - US Instrument teams, Interdisciplinary scientists, Telescope scientist
2. Duplication checking
   - Duplications resolved by NASA HQ
3. Total time requirement
   - NASA policy requires Cycle 1 GTO time to comprise between 25% and 49% of the total time available to GO & GTO in Cycle 1
   - Corresponds to at least 1970 hours in Cycle 1
   - ~5500 hours remain for Cycle 1 GO programs

GTO Cycle 1 observation list will be finalised for release by June 15 2017

JWST Science Planning Timeline

(as of July 2016)



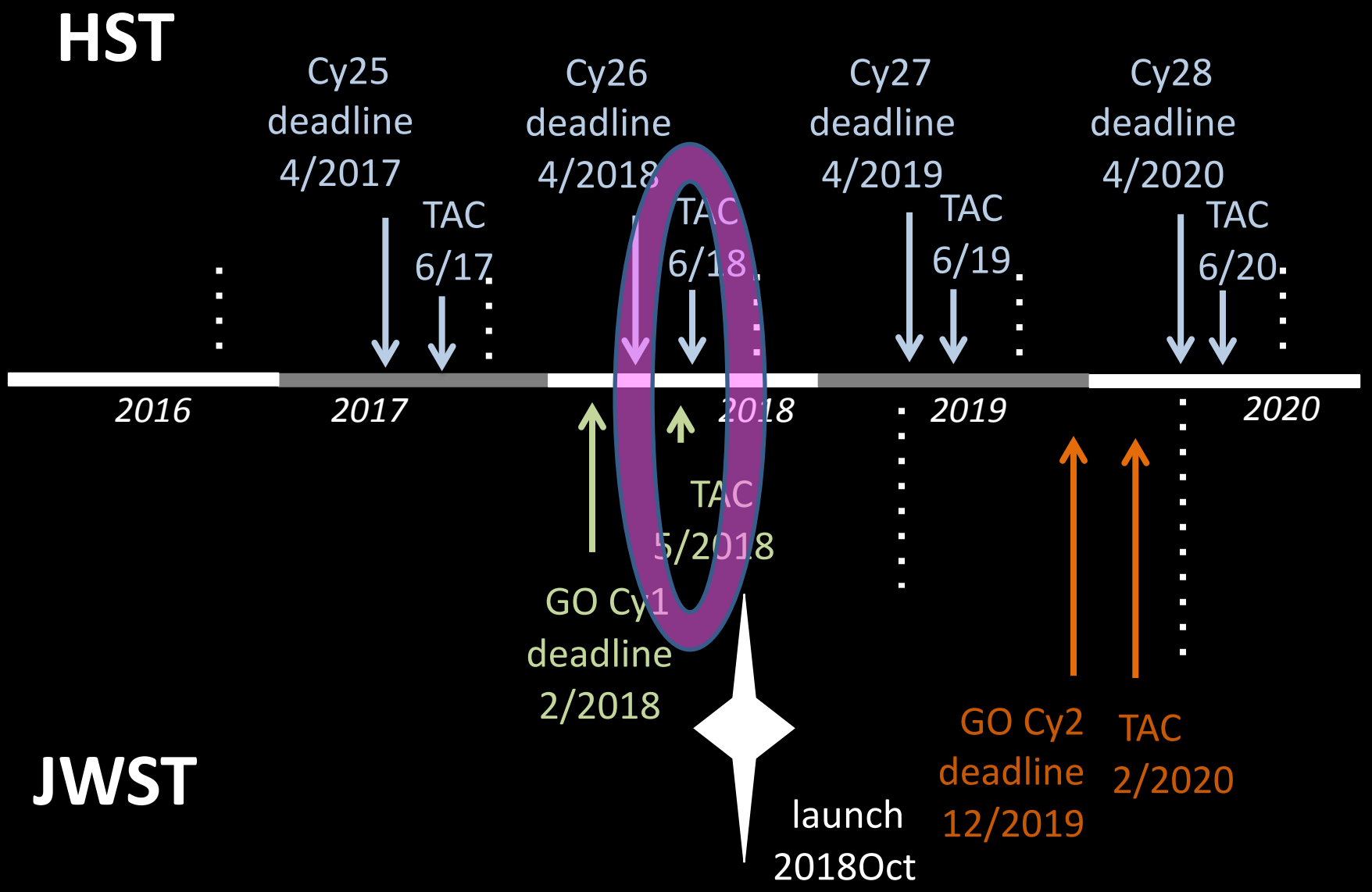
JWST GO Program Types

- We anticipate that JWST GO size categories will include
  - Small, Medium, Large, Very Large
- We anticipate a balanced distribution in program sizes over all JWST cycles
  - Small/Medium/Large in early cycles
  - The majority of time will likely be allocated to Small programs
    - But there will be no cap on program size
  - Very Large programs will be introduced in later cycles
- We also anticipate specialised categories
  - Long-term programs → Regular/Medium programs whose science requires observations in future cycles (astrometry, variability)
  - ToO programs
  - Treasury/Legacy programs → programs with broad science reach and emphasis on providing higher-level data products for the community
  - Joint programs with other facilities will not be available until Cycle 2
- JWST will offer limited coordinated science parallels in Cycle 1
  - Pure parallel GO programs will be also available
- JWST will also accept proposals for archival & theory research programs

STScI is continuing to refine these concepts in consultation with the JSTAC.

JWST and HST

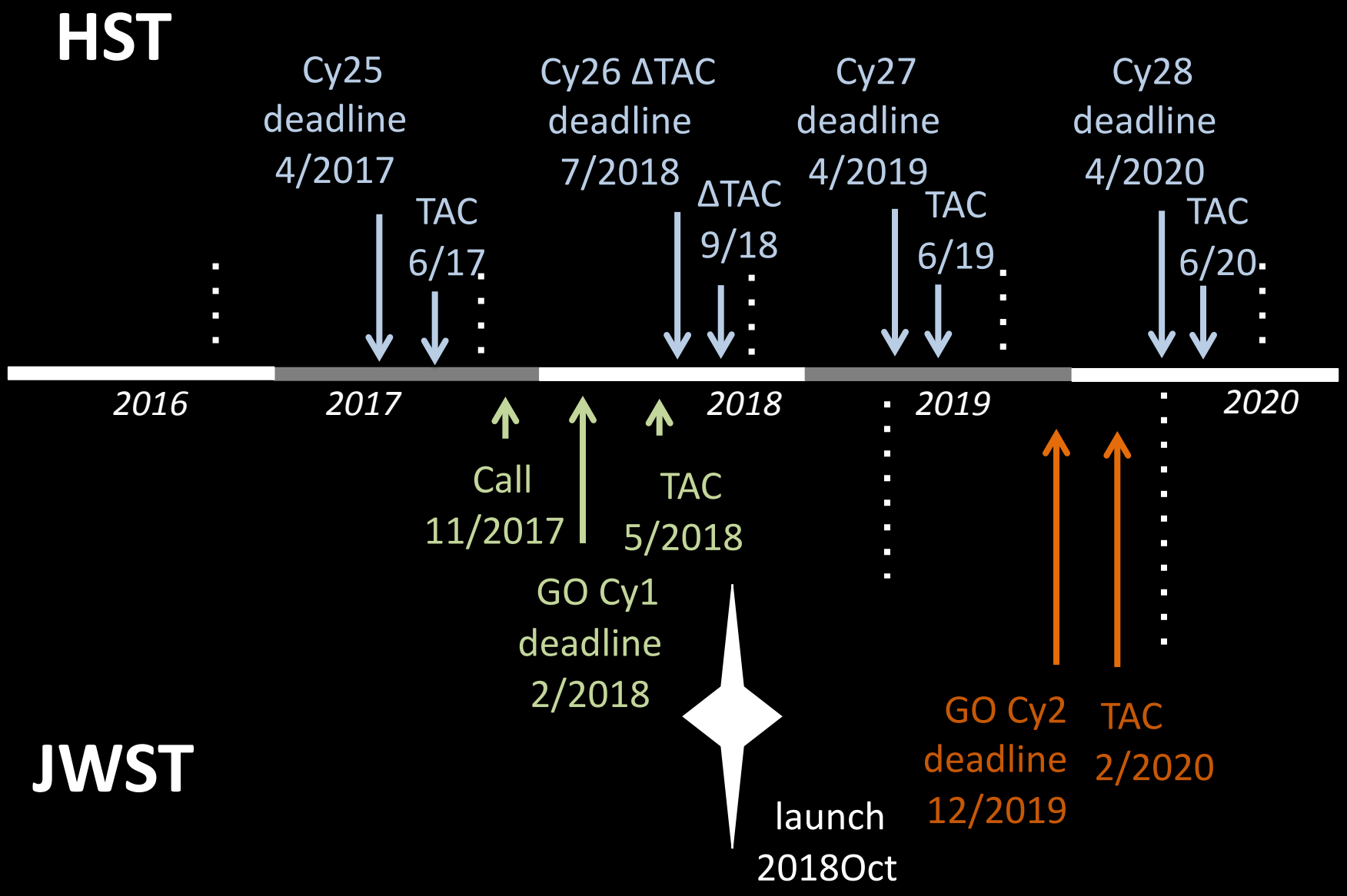
HST & JWST in 2018: Baseline schedules



Restructuring HST Cycles 25 & 26

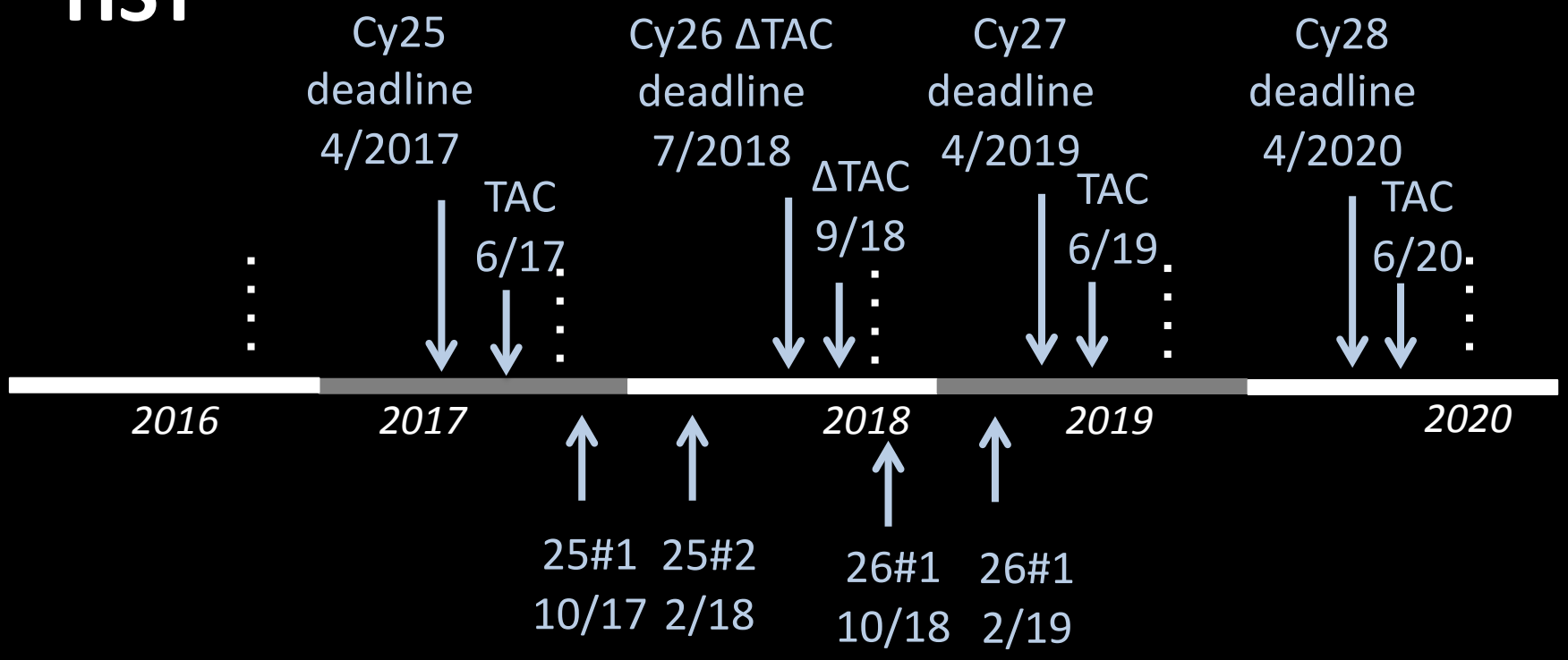
- Minimise HST activities in 2018 → reduce the overall workload in that year for the community and for STScI
  - Pre-allocate Cycle 26 orbits @ Cycle 25 TAC
    - Allocate ~4600 orbits @ 2017 Cycle 25 TAC
      - Orbit allocation for each panel increased by 50%
      - All proposals selected must be deemed worthy of HST time
        - » Panels consistently indicate they are willing to select twice as many programs as they have orbits to support
    - Retain ~600 orbits for 3-4 mid-cycle opportunities
      - Limited to proposals for <10 orbits
    - Allocate ~1100-1200 orbits at Cycle 26 Δ TAC in 9/2018
      - Limited to medium and large proposals
      - Focus on supplementing accepted JWST Cycle 1 programs
    - Revert to current HST schedule in 2019 (Cycle 27)

Restructured schedules: HST Cycles 25 & 26



HST: Mid-cycle opportunities

HST

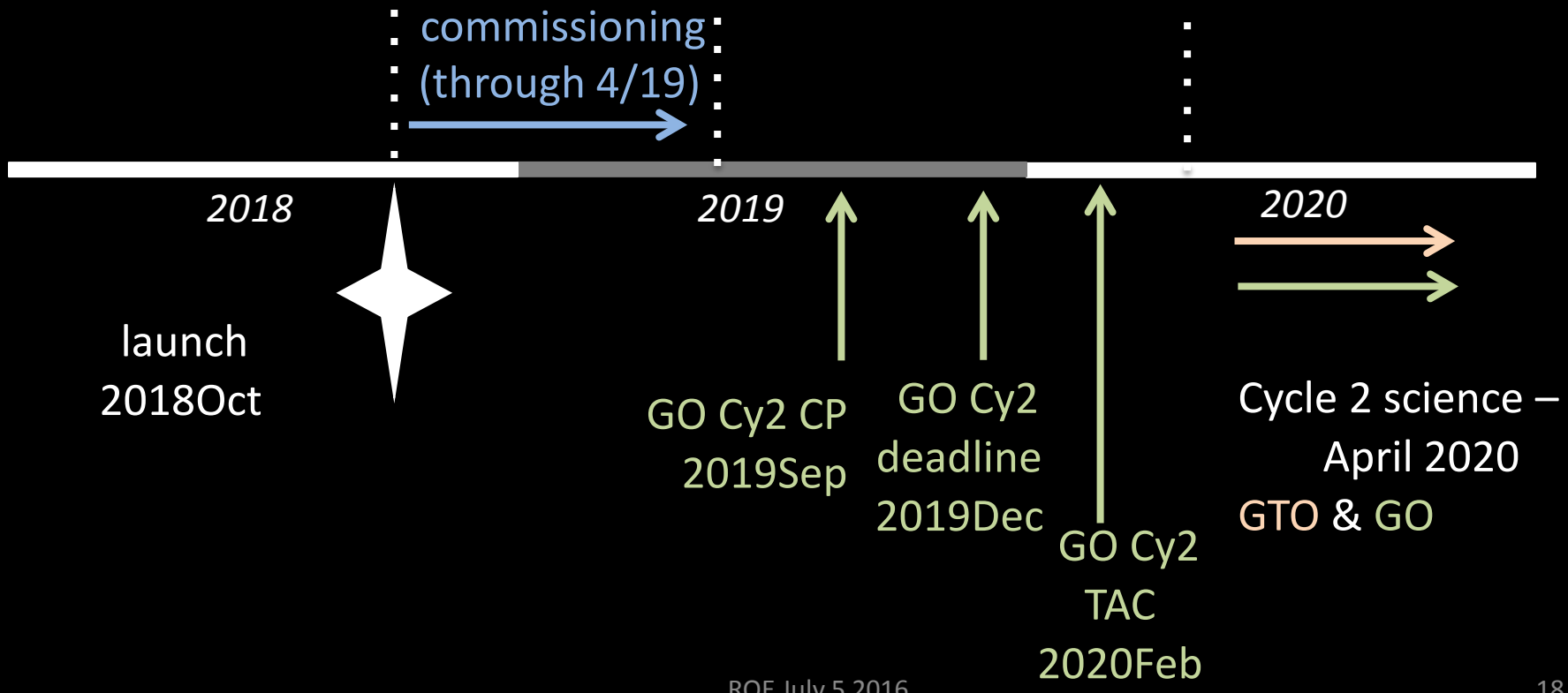


Mid-cycle

JWST and data access
The ERS program

Cycle 2 proposal schedule

- JWST science observations start in April 2019
  - Cycle 2 CP in September 2019, ~5 months into Cycle 1
  - Cycle 2 proposal deadline in early December 2019, ~7.5 months from the start of Cycle 1
- **The general community will have very limited access to non-proprietary observations to aid preparations for Cycle 2 programs**



Enabling data access

The JWST Advisory Committee recommended implementation of an Early Release Science Program

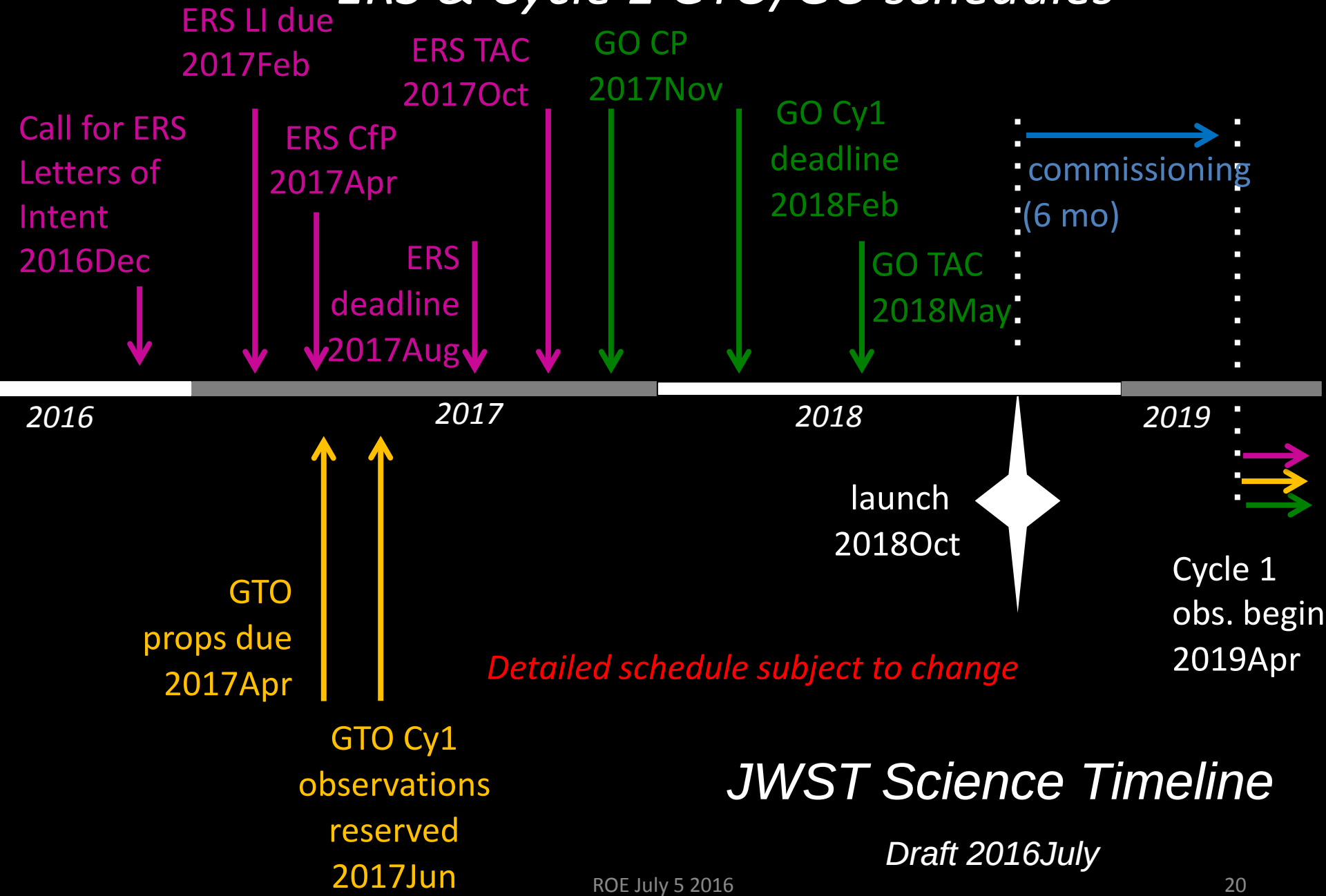
- *"..to obtain images and spectra that would be used to demonstrate key modes of the JWST instruments. The goal of this program is to enable the community to understand the performance of JWST prior to the submission of the first post-launch Cycle 2 proposals that will be submitted just months after the end of commissioning." (see JSTAC letters 21/6/2010 & 26/3/2014)*

Concept: A suite of science-driven observing programs, designed by the community and selected through proposal peer review :

- Supported by ~500 hours of Director's Discretionary Time
  - Data have no exclusive access period
- Programs selected by peer review prior to Cycle 1 GO Call

The ERS comprises programs from the community selected by the community for the community

ERS & Cycle 1 GTO/GO schedules



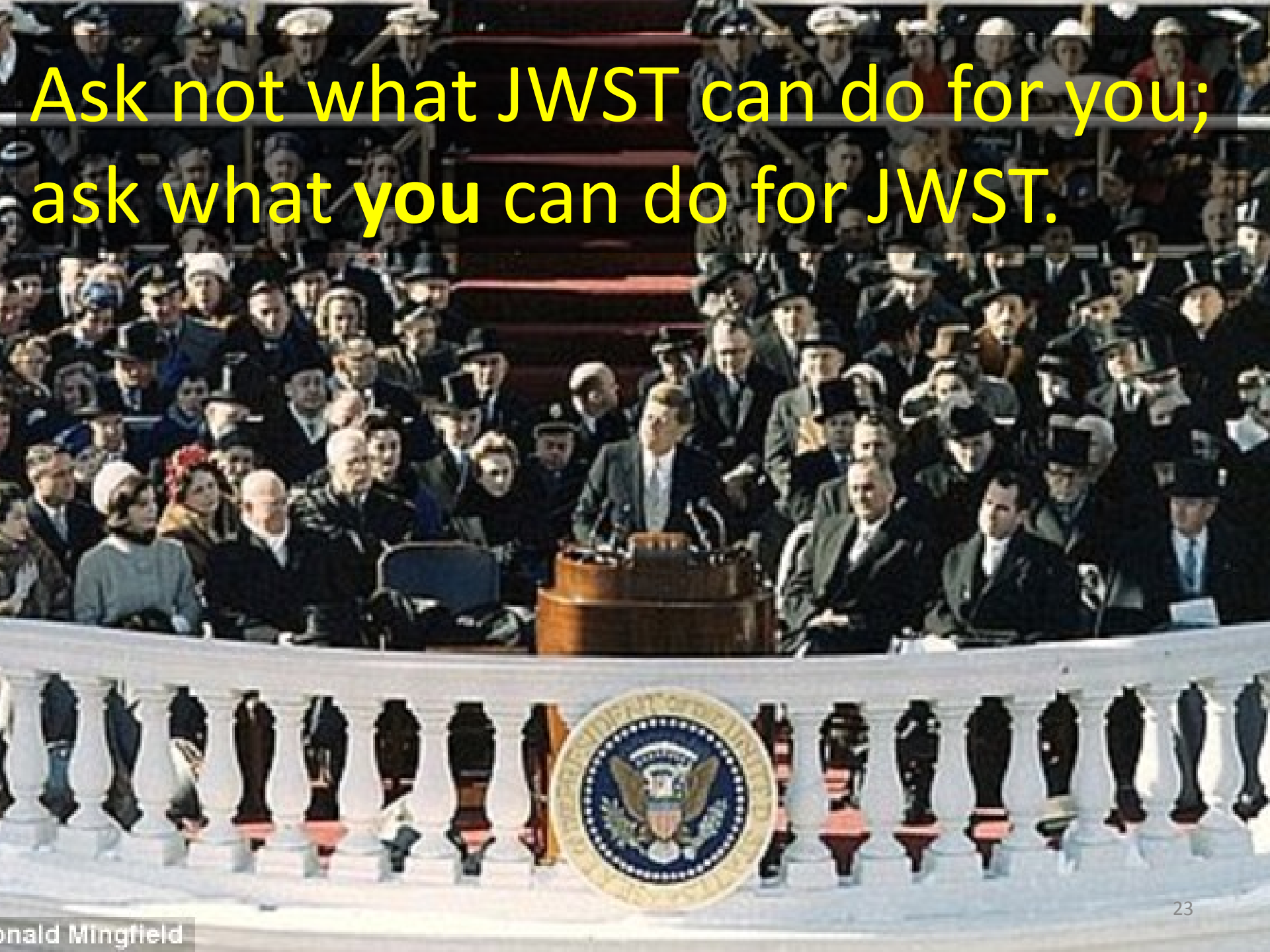
JWST Science Timeline

Draft 2016July

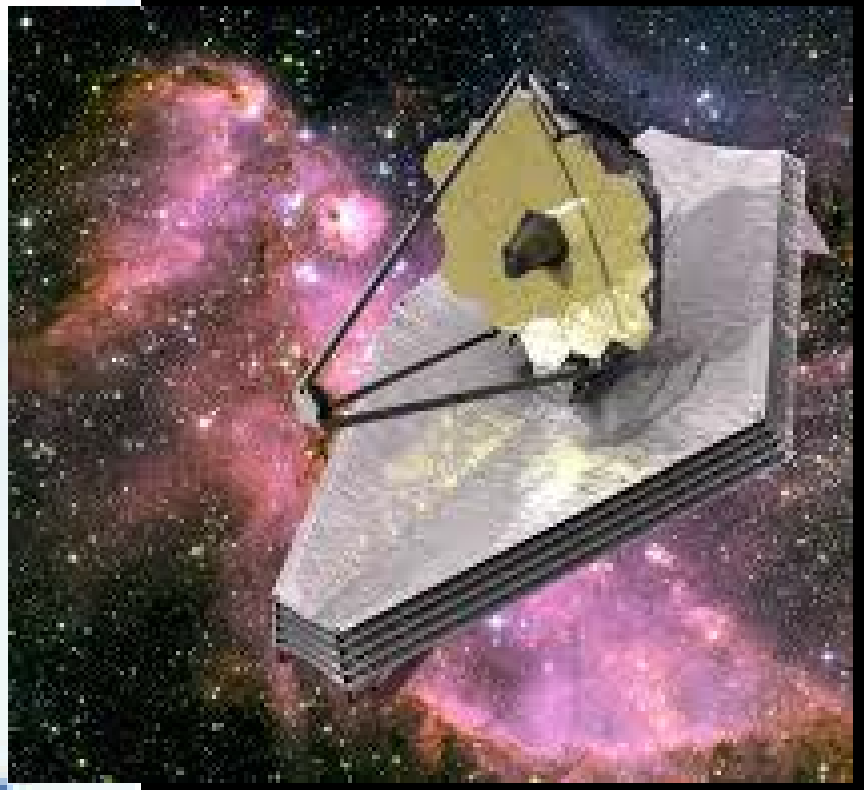
What distinguishes an Early Release Science proposal from a Cycle 1 GO proposal?

Program selection criteria

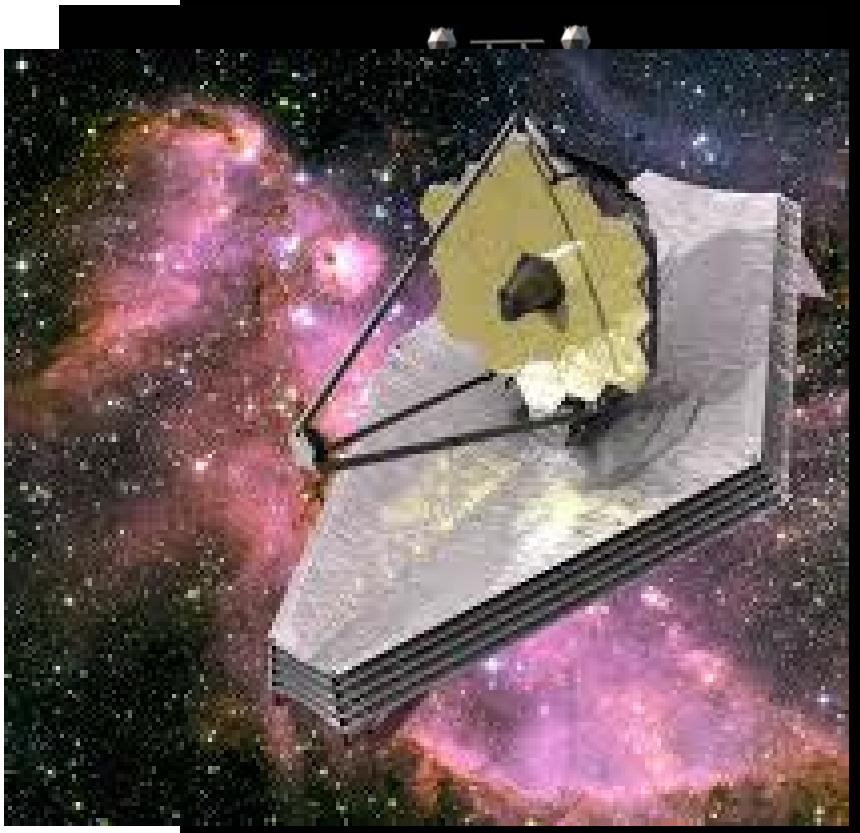
- TAC reviews focus almost exclusively on science
  - Reviewers are tasked with selecting the most compelling science
- The prime focus of the ERS program is preparing the community to maximise JWST's scientific productivity in Cycle 2 and beyond
  - Reviewers will select programs based on additional criteria beyond compelling science, including technical challenges, community involvement & science-enabling capabilities
  - ERS proposals have an altruistic element
    - How will you help your colleagues exploit JWST?


Ask not what JWST can do for you;
ask what **you** can do for JWST.
onald Mingfield

JWST




JWST
NEEDS
YOU



Program expectations

What are the expectations for an ERS program?

- Substantive programs that utilise key instrument modes
  - Focus on representative datasets that will be of broad community use
    - Basic imaging and spectroscopy, not specialist modes
    - Demonstrate JWST's baseline scientific capabilities
  - Anticipate 10-15 programs supported
    - Typical program size, 20-50 hours
  - Proposers are encouraged to combine complementary observations in multiple instruments/modes to form coherent science programs

Program expectations: teams

What are the expectations for an ERS program?

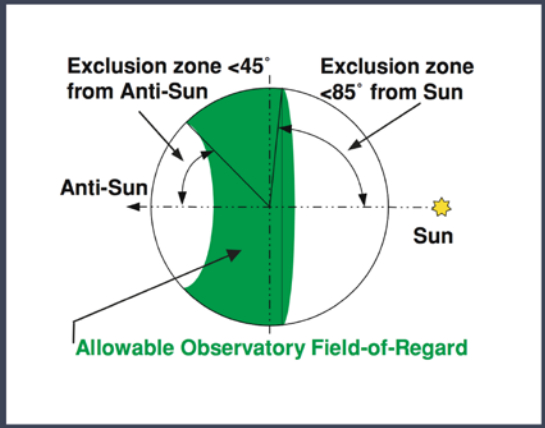
- Strong, diverse community involvement in the proposal team
  - Supported by Director's Discretionary Time, the ERS program must directly benefit as broad a community as possible
  - We encourage the community to self-organise around specific themes/science topics
    - Broad community support for a program makes it easier for a multi-disciplinary TAC to assess merit and impact
  - Breadth in participation will be a factor considered by the TAC and the Director

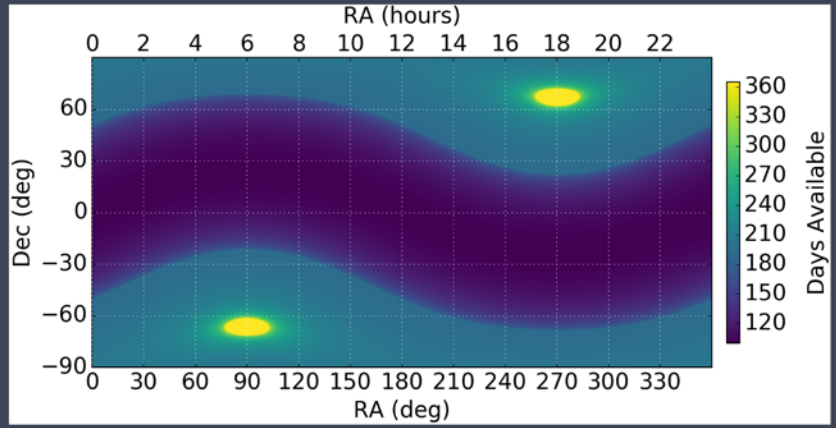
We must, indeed, all hang together or, assuredly, we shall all hang separately.

Program constraints: science topics & target selection

What are the constraints for an ERS program?

- Proposals may be limited to select science themes
  - The Director may choose to focus on specific topics,
    - e.g. galaxy evolution, exoplanets, star formation, solar system
- Proposals need to identify accessible targets
  - Aim is to schedule most ERS observations during first ~4 months of Cycle 1
    - Accessible regions ~12-15hrs, ~21-0hrs, CVZ @ June
    - Programs should be flexible to accommodate potential external scheduling constraints

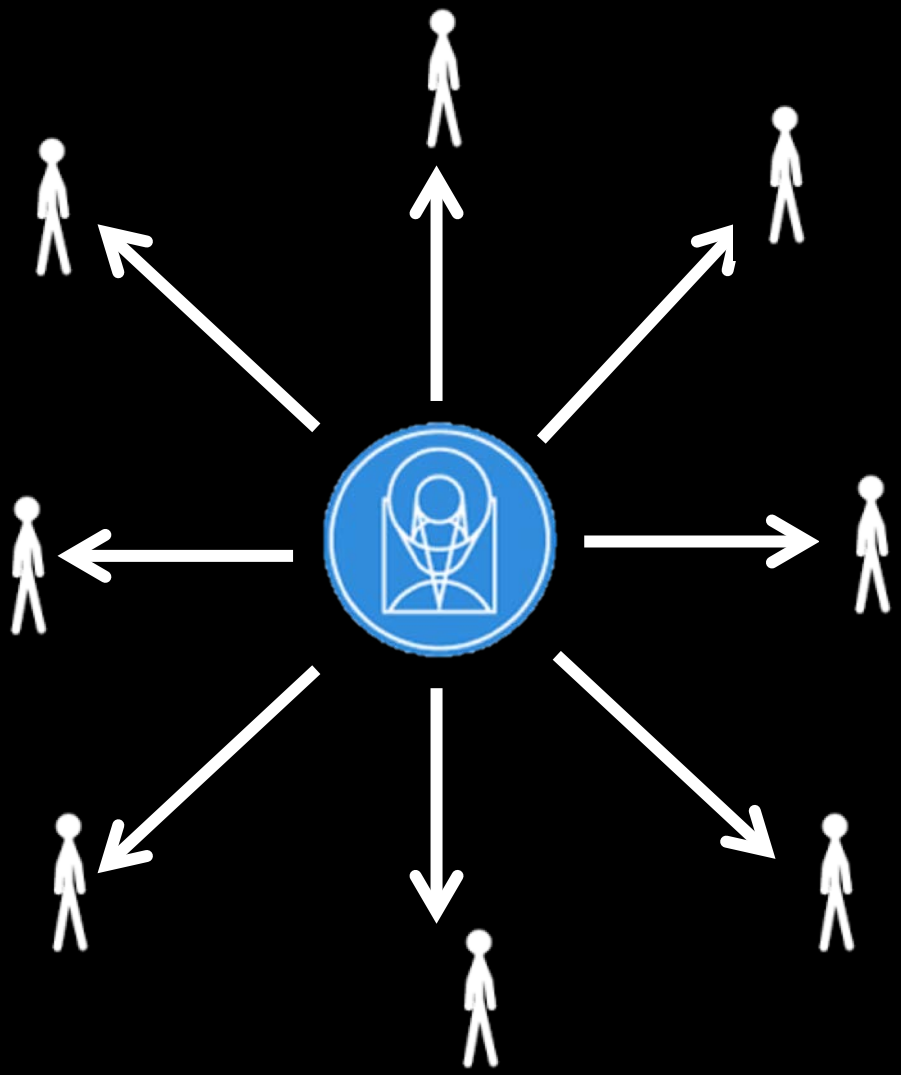


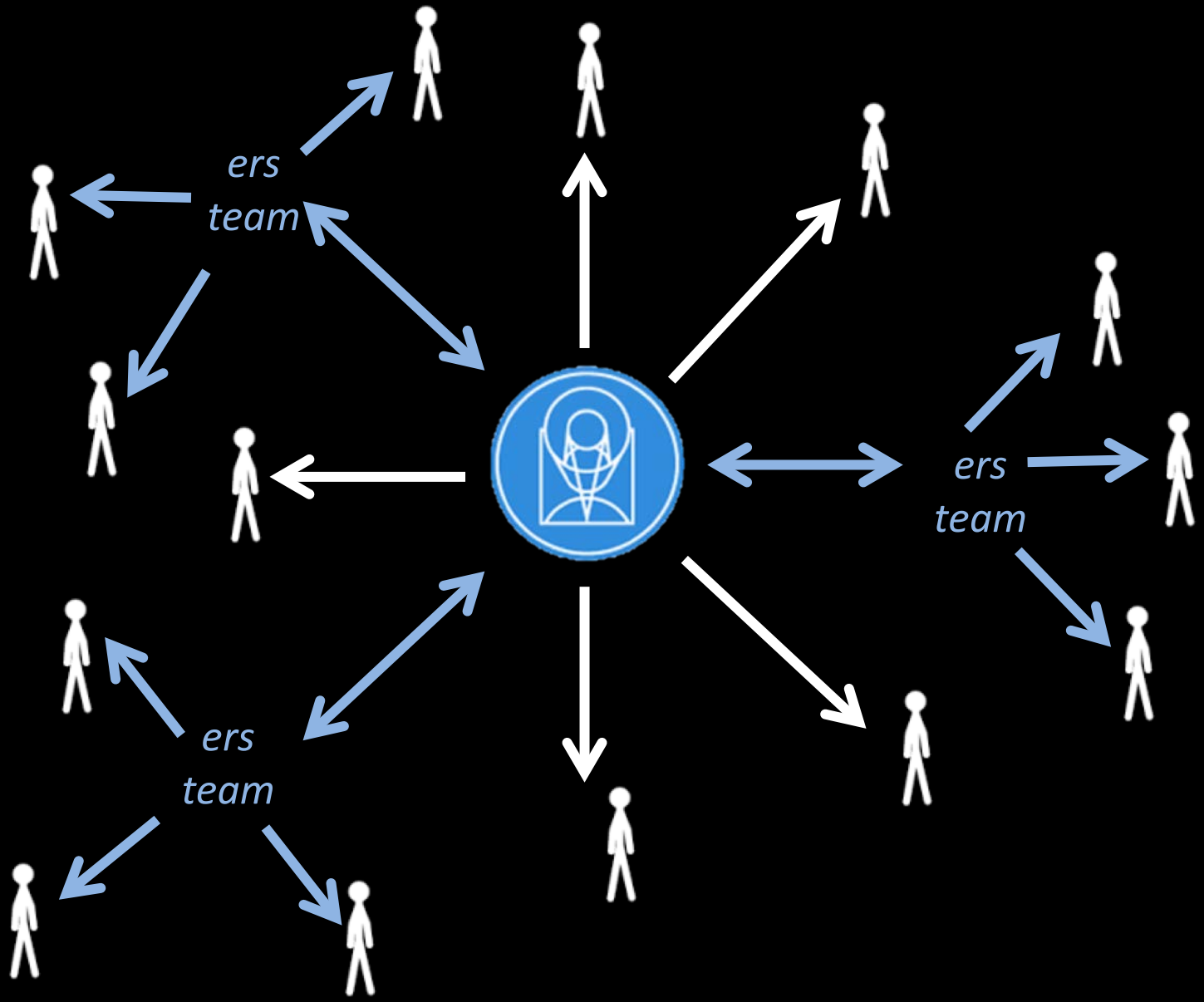


Program requirements: informing the community & data products

ERS programs should give back to the community

- Proposals must have well developed plans for delivering science-enabling data products to the community
- ERS activities will also provide a focus for organising GO support and disseminating information to the community
  - Webinar/webex team briefings
  - Project updates & feedback




ers
team
ers
team
ers
team

ERS program characteristics: summary

- ERS must have broad community involvement
  - Community is encouraged to self-organise
- ERS programs must provide datasets of broad community interest
  - Focus should be on widely used observing modes
- ERS programs must merit JWST time
- ERS programs will be of medium scale (20-50 hrs)
- ERS programs may be limited to select science themes
- ERS programs must select accessible targets
  - Target lists should have some flexibility
- ERS proposals must identify useful data products and include a management plan for their delivery

ERS schedule

- Call for *mandatory* Letters of Intent - 12/2016
  - Letters must specify PI & co-I team, project title & short abstract, estimated program size
    - NOI should also address broad, diverse community involvement
    - A well-balanced distribution of team members in terms of gender and geography is essential
  - Letters due 2/2017
  - Confidentiality will be maintained
  - Enable STScI to assess community interest, topical areas and identify potential TAC members
- ERS preliminary call issued 12/2016 to guide LI preparation
- Final ERS Call issued in April 2017
- Proposal deadline August 2017
  - ERS programs may not duplicate observations from GTO Cycle 1 programs (available 15/6/2017)
  - Proposals submitted via APT

ERS proposal format

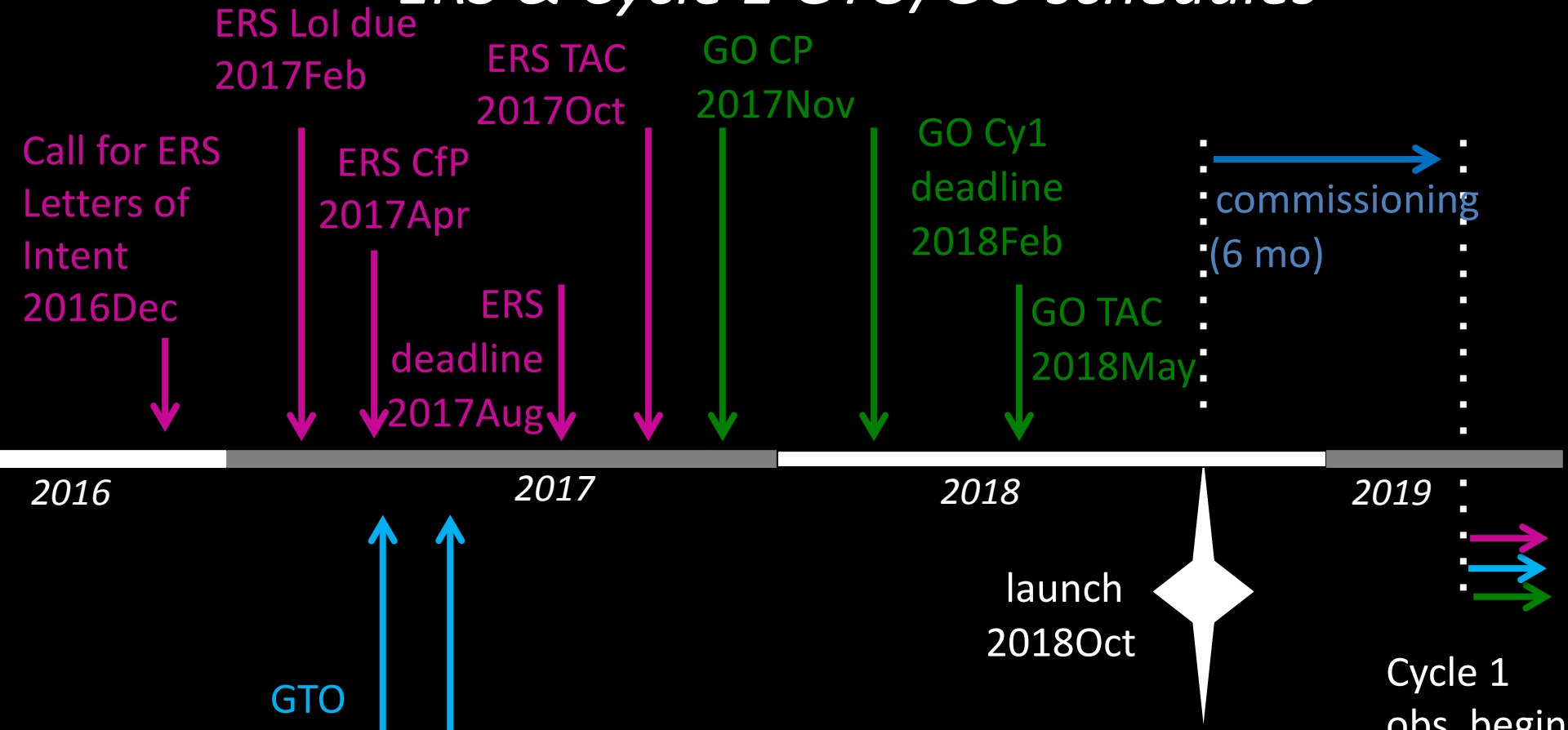
ERS program characteristics define the format for the ERS proposal text:

- Rationale for ERS time
  - *What modes are utilised and technical challenges are addressed?*
  - *What's the community involvement in the proposal?*
  - ***How does the proposal help the broader community prepare for JWST Cycle 2?***
- Management plan
  - *Description of science-enabling data products*
  - *Schedule for product deliveries*
- Scientific Justification
  - *Why does the project merit JWST observations?*
- Description of Observations
  - *Flexibility in target selection*

ERS proposal review

- ERS proposals will be subject to peer review
  - With a focus on community proposals, we aim for 50-70 submissions in total
- Review by TAC drawn from the community (including ESA & Canadian representation)
  - 15-20 participants, spanning a broad range of disciplines
- Proposals will be assessed based on
  - Return to the community
  - Diverse participation
  - Management plan
  - Scientific merit
- TAC recommendations to the Director
  - Final selection by early November 2017
- Accepted ERS programs will be available as AT templates for Cycle 1 GO proposers

ERS & Cycle 1 GTO/GO schedules



Detailed schedule subject to change based on JWST/HST proposal schedule review

JWST Science Timeline

Draft 2016July

Summary

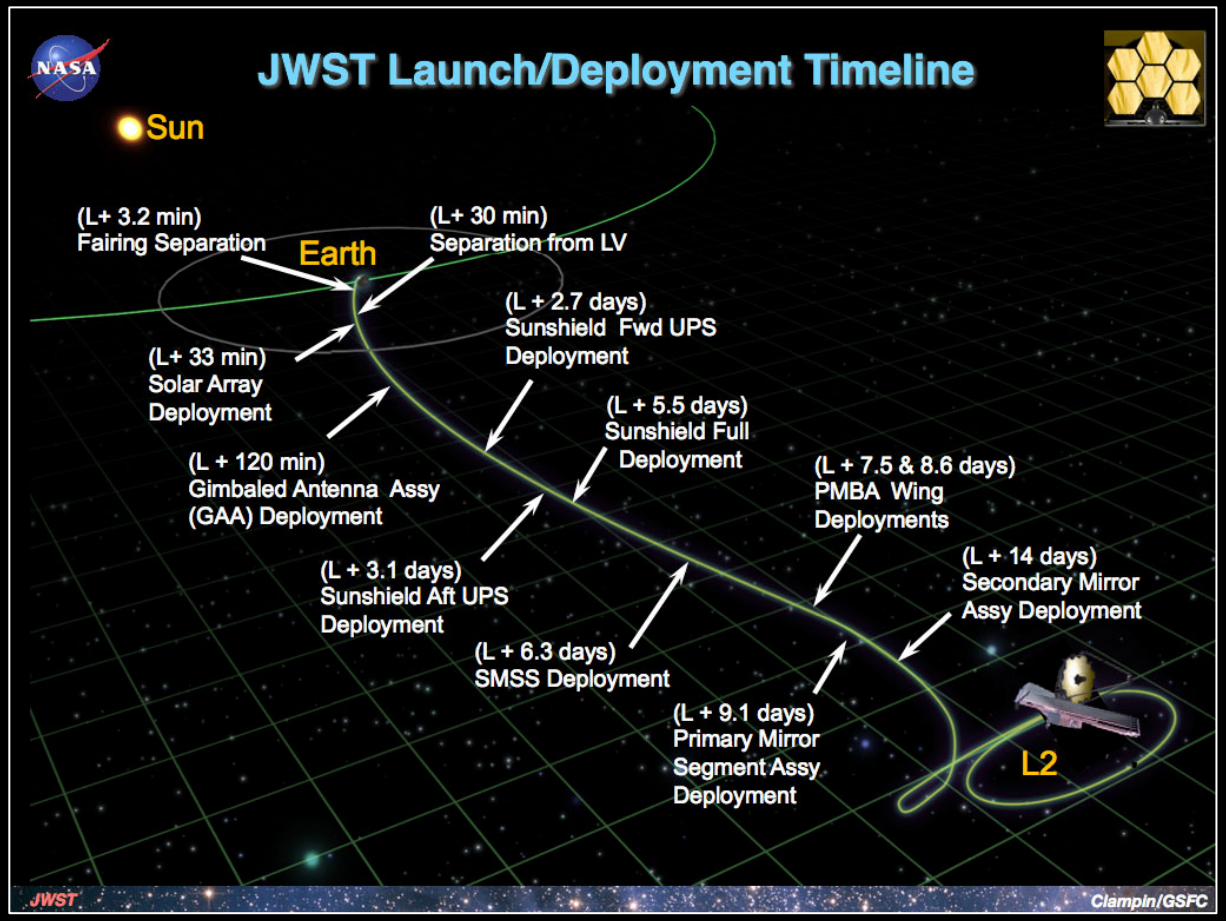
- We continue to refine the science planning timeline for JWST
  - ERS Notices of Intent due February 2017
  - GTO proposals are due April 2017, observations released by june 15 2017
  - ERS proposals due August 2017, TAC in October 2017
  - GO Cycle 1 Call in November 2017, proposal deadline in
- The HST proposal timeline has been restructured to support and complement the JWST Cycle 1 timeline
- We have defined a framework for the Early Release Science program
  - The prime focus is on programs that have broad community involvement
  - The goal is preparing the community to maximise JWST's scientific productivity in Cycle 2

Backup slides

Classes of Observations

Commissioning [6 mo: 2018 Oct-2019 Apr]

- *full schedule of deployment & check-out activities*
- *limited set of science calibration obs possible*
- *science obs highly unlikely*



At L2 after ~1mo, turn on/check-out

- *FGS/NIRISS*
- *NIRCam*
- *NIRSpec*
- *MIRI*

phase mirrors, etc.

Provides distinguishing features from GO Cy1 & requirements for ERS proposals:

1. JWST ERS programs will be designed and executed by community investigators, and selected by peer-review.
2. ERS is envisioned as a director's discretionary program, which will provide a total of ~500 hours of time. Program scale
3. ERS programs will be selected to span key JWST observing modes, data analysis challenges, and science areas. JWST offers 14 distinct imaging, coronagraphic, and spectroscopic observing modes from the optical to the mid-infrared (0.6 - 28.3 microns). *Programs need to identify and tackle key technical challenges.*
4. ERS will be comprised of substantive, science-driven programs, which have the potential to enable community Cycle 1 archival research, and/or to be building blocks with which the community can use to design larger JWST observing programs in the future. *Conceptually ~ten-fifteen 25-75 hour programs.*
5. ERS observations will have no proprietary period. Immediate access
6. ERS observations will be among the first observations to execute after commissioning in Cycle 1. *(Must be schedulable early Cy1; CVZ targets preferred.)*
7. ERS teams will be responsible for the delivery of science enabling products to the community in coordination with the Mikulski Archive for Space Telescopes (MAST). The delivery timescale should be sufficiently rapid to support community preparation of Cycle 2 proposals.
8. ERS proposals will be reviewed, selected, and publicized prior to the release of the GO Cy1 Call for Proposals. The ERS proposal deadline is planned for 2017Aug.

How much GO time in Cycle 1?

- 8766 hours available to schedule
- Up to 10% of total time as DD time
  - 876 hours → ~7900 hours for GO+GTO
- NASA policy requires that GTO programs account for between 25% and 49% of the time available to GO and GTO programs in Cycle 1
  - Assume ~2200 hours for GTO time
- GO programs would constitute ~5700 hours in Cycle 1
- Hubble has ~3500 science orbits/year
  - ~5200 hours (with overheads)
- JWST Cycle 1 will offer more GO time than a typical Hubble Cycle
- GO allocation increases in Cycle 2 & 3 as GTO time decreases

Maximising the science from JWST

- Start building test programs with APT!
  - Start understanding the observational constraints
- Take full advantage of the ERS program
  - Develop extended, representative collaboration team
  - Identify foundational science observations that prepare your field for Cycle 2
  - Develop a plan for producing science data products that highlight how key JWST performance characteristics enable world-beating science