Context

• Our charge at STScI is to maximise the scientific return of the missions we operate.
• JWST is a mission with highly complex instrumentation and a 5-year lifetime requirement, 10-year goal.
• JWST will offer a range of observing programs.
• Maximising JWST’s scientific potential requires that the community rapidly understand and uses its capabilities.
• Data access is key to understanding JWST’s capabilities.
  – An Early Release Science program, generated by the community, can play a crucial role in providing broad access to representative datasets early in Cycle 1.
  – Early data access increases the intellectual cycles by highlighting JWST’s capabilities and enabling more ambitious Cycle 2 GO programs.
JWST Advisory Committee

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)

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

• JWST Science Planning Timeline
  – What happens when?
• Observing Programs
  – Proposal types
• An Early Release Science Program
JWST Science Planning Timeline
JWST Science Planning Timeline
(draft schedule as of January 2015)

launch
2018Oct
JWST Science Planning Timeline
(draft schedule as of January 2015)

- Commissioning proposals
- Commissioning (through 4/19)
- Launch: 2018 Oct
JWST Science Planning Timeline
(draft schedule as of January 2015)

- Commissioning proposals
- Commissioning (through 4/19)
- Launch: 2018 Oct
- Early Release Observations (EROs)
JWST Science Planning Timeline
(draft schedule as of January 2015)

- Commissioning proposals
  - GO CP 2017Nov
- Commissioning (through 4/19)
- Launch 2018Oct
- Early Release Observations (EROs) 2019
JWST Science Planning Timeline
(draft schedule as of January 2015)

- **Commissioning proposals**
- **GO CP**
  - 2017Nov
  - 7 mo
- **GTO CP**
  - 2017Jan
  - Launch 2018Oct
  - Observations finalized No later than 2017Sep
- **GTO Prop deadline**
  - 2017Apr
- **GTO Cy1 programs** have priority on specific observations of specific targets. A full list for Cycle 1 will be available at the release of the Cycle 1 GO call.

The timeline spans from 2015 to 2021.
**JWST Science Planning Timeline**  
*(draft schedule as of January 2015)*

- **Commissioning proposals**
- **GO CP** 2017Nov
- **GO Cy1 deadline** 2018Feb
- **TAC** 2018May
- **launch** 2018Oct
- **GTO Cy1 observations finalized** No later than 2017Sep
- **GTO programs have priority on specific observations of specific targets. A full list for Cycle 1 will be available at the release of the Cycle 1 GO call.**
JWST Science Planning Timeline

(draft schedule as of January 2015)

- **GO CP**
  - 2017Nov
  - 7 mo

- **GO Cy1 deadline**
  - 2018Feb

- **TAC**
  - 2018May

- **Commissioning**
  - (through 4/19)

- **Cycle 1 science** – April 2019

- **GTO & GO**

- **GTO CP**
  - 2017Jan

- **GTO Prop deadline**
  - 2017Apr

- **GTO Cy1 observations finalized**
  - No later than 2017Sep

- **Launch**
  - 2018Oct

Timeline:
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
JWST Science Planning Timeline
*(draft schedule as of January 2015)*

- **2015**
  - **comissioning proposals**
  - **GTO CP 2017Jan**
  - **GTO Prop deadline 2017Apr**
  - **GTO Cy1 observations finalized No later than 2017Sep**

- **2016**

- **2017**
  - **GO CP 2017Nov**
  - **7 mo**
  - **GO Cy1 deadline 2018Feb**
  - **TAC 2018May**
  - **GTO & GO**

- **2018**
  - **Cycle 1 science - April 2019**
  - **launch 2018Oct**
  - **2 mo**

- **2019**
  - **2019**

- **2020**

- **2021**

- Anticipate annual observing cycles
**JWST Science Planning Timeline**
*(draft schedule as of January 2015)*

- **GTO commissioning proposals**
  - GTO CP: 2017Jan
  - GTO Prop deadline: 2017Apr
  - GTO observations finalized: No later than 2017Sep

- **GO CP**
  - 2017Nov
  - 7 mo

- **GO Cy1**
  - deadline: 2018Feb
  - TAC: 2018May

- **Cycle 1 science**
  - April 2019

- **GTO & GO**
  - 2018Feb

- **2015-2021**
  - Cycle 2
    - September - CP release
    - December – proposal deadline
    - February 2020 – TAC
    - April 2020 – Cycle 2
Observing Programs
Observations

• JWST will be at L2
  – Continuous observations (in principle) analogous to Spitzer rather than Hubble

• Observing programs will be allocated wall-clock time
  – Overheads incorporated in the allocation
  – 8,766 hours available per year
    • 5,000 to 6,000 hours on-target integration time
Classes of Program

• 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
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
JWST Discovery Space

- JWST will be an incredibly powerful machine
  - 10-100x sensitivity advantage over HST/Spitzer at higher resolution
  - Extensive discovery space for exploratory science in relatively small time allocations
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
  - Very Large programs will likely be introduced in later cycles (Cycle 3?) as more GO time becomes available and capabilities are better defined
- 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 (e.g., Hubble, Chandra, ALMA/NRAO, ground-based OIR facilities)
- JWST will also accept proposals for archival & theory research programs

STScI is continuing to refine these concepts in consultation with the JSTAC.
An Early Release Science program

A science program of the community chosen by the community for the community
JWST & the future of astrophysics

• JWST is NASA’s highest science priority and one of the largest science programs ever undertaken by the United States.
  – JWST needs to be correspondingly productive
JWST & the future of astrophysics

• JWST is NASA’s highest science priority and one of the largest science programs ever undertaken by the United States.
  – We need to make JWST correspondingly productive
JWST & the future of astrophysics

• JWST is NASA’s highest science priority and one of the largest science programs ever undertaken by the United States.
  – We need to make JWST correspondingly productive
• JWST is an incredibly powerful machine
see the Universe’s first galaxies
uncover newborn stars and planets
determine how galaxies evolve
study the origins of life
Exoplanet characterisation

Solar System observations
JWST & the future of astrophysics

• JWST is NASA’s highest science priority and one of the largest science programs ever undertaken by the United States.
  – We need to make JWST correspondingly productive

• JWST is an incredibly powerful machine with complex instrumentation
Complex Instruments

- >40 imaging filters
- 8 spectroscopic modes
  - (multi-object, IFU, wide field grism, single object)
- multiple coronagraphs

NIRCam

NIRSpec

MIRI

Moving Target Support

Ultra Deep Fields

MOS in Space

MIR IFU Spectroscopy

TITAN

NIR IFU Spectroscopy

High Contrast Imaging

NIRISS
JWST & the future of astrophysics

• JWST is NASA’s highest science priority and one of the largest science programs ever undertaken by the United States.
  – We need to make JWST correspondingly productive
• JWST is an incredibly powerful machine with complex instrumentation
  – 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.
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 preparation starts ~October 2019, ~6 months into Cycle 1
  - Cycle 2 proposal deadline in early December 2019, ~7.5 months into Cycle 1
- The general community will have very limited access to non-proprietary observations to aid preparations for Cycle 2 programs

- JWST science observations start in April 2019
  - Cycle 2 CP in September 2019, ~5 months into Cycle 1
  - Cycle 2 proposal preparation starts ~October 2019, ~6 months into Cycle 1
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- The general community will have very limited access to non-proprietary observations to aid preparations for Cycle 2 programs
An Early Release Science Program

• The JWST Advisory Committee has recommended implementation of the First Look/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.”
  – “The data from this ‘First-Look’ program would complement the Early Release Observations (ERO) and the Science Verification (SV) datasets.”
  – “The JSTAC recommends that the First-Look data be released both in raw form and with any initial calibrations as soon as possible; the key aspect is speed.” [JSTAC letter, 21/6/2010]

• The concept was discussed with the JWST Science Working Group in July 2013
An Early Release Science Program

• The JSTAC refined the concept in its May 2013 & November 2013 meetings.

• The primary goal of the program is to maximise the science impact of JWST by
  – Educating the community as to the scientific capabilities of JWST’s key instruments and modes
  – Ensuring rapid data availability so that the community can generate proposals for Cycle 2 that take maximal advantage of JWST’s powerful capabilities
  – Engaging the community in the planning of the ERS program

• To achieve those goals, the program should
  – Provide a wide range of scientifically interesting datasets
  – Exercise a wide range of the expected-to-be-used modes for a range of science topics
  – Be carried out very early in the first cycle
  – Begin the planning process in an early, open way with proposals from community members

• The JSTAC restated its support for a robust, community-led ERS program at its December 2014 meeting
Organising principles

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

• Programs will be required to address specific technical challenges
  – E.g. crowded field photometry, high mid-IR background, spectral extraction, MOS observations (known targets)
• The program will likely be supported by Director’s Discretionary Time
  – Program scale: few hundred hours
• Data will have no exclusive access period
• Observations specified & proposals in place by Cycle 1 GO Call
  – Provides APT templates for the GO community
  – Enables AR proposals and synergistic GO proposals for supplementary and/or complementary observations
  – ERS programs cannot duplicate GTO observations
  – GO programs cannot duplicate ERS observations
• Calibrated data products will be made available on a rapid basis
  – STScI will provide assistance in their production
JWST ERS Science Planning Timeline
(draft schedule as of January 2015)

- **Community discussion of ERS Program; Define ERS science & technical priorities**
- **ERS proposal submission & review**
- **Finalise ERS**

2015

- GTO CP Jan 2017
- You are here

2016

- GTO Prop deadline Apr 2017

2017

- **GTO Cy1 targets finalized No later than Sep 2017**

2018

- launch 2018 Oct

- GO Cycle 1 CP 2017 Nov
- GO Cycle 1 deadline 2018 Feb
- GO Cycle 1 TAC May 18

2019

- Cycle 1 2019 Apr
- ERS Proposals submission & review
- GTO & GO Cycle 1 TAC May 18

2020

- Cycle 2 2020 Apr
- GTO & GO Cycle 2 CP 2019 Sep
- GO Cycle 2 deadline 2019 Dec
Next steps

• Refine the program concept
  – Identify appropriate range of technical challenges to be addressed by ERS programs
  – Develop more detailed definition of program specifications, e.g.
    • Size constraints, target distribution ($\alpha, \delta$), target flexibility, etc.
  – Develop a more detailed implementation timeline
  – Explore options for funding
• The overall program will be shaped based on community input. We will shortly circulate a poll to determine
  – overall community interest,
  – instrument preferences,
  – science topics, etc.
Summary

- The JWST science planning timeline
  - Cycle 1 deadline currently set for February 2018
- JWST will offer a balanced range of GO programs
- We propose to implement a community-selected Early Release Science program that will provide representative datasets for key instrument modes through a suite of science-driven observing proposals
  - We invite your active participation in defining and implementing that program
- In the meantime,
  - Contact us at the STScI booth, or
  - E-mail suggestions (to jwst_ers @ stsci.edu)
Upcoming events

User Training in JWST Data Analysis
May 6-8, 2015
http://www.stsci.edu/institute/conference/ut_jwst_da

Exploring the Universe with JWST
October 12-16, 2015:
ESA/ESTEC – Netherlands

http://congresprojects.com/2015-events/15a02/introduction