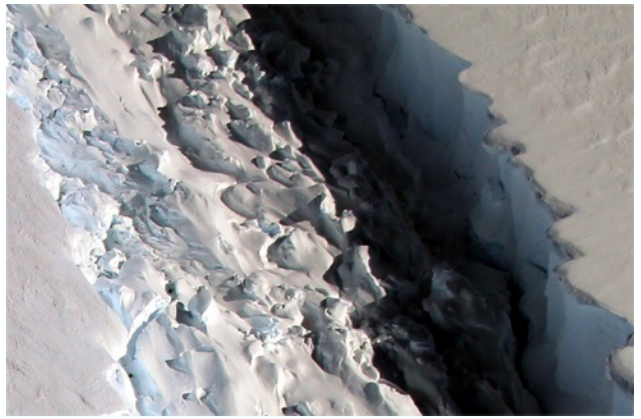
SCIENCE



Surface Biology and Geology Designated Observable Study

Jamie Nastal

June 12, 2019

Pre-decisional - For Discussion Purposes Only

SBG Study Overview

- The SBG Study has three objectives:
  1. Identify and characterize a diverse set of high value SBG observing architectures
  2. Assess the performance and cost effectiveness of architectures against SBG research and applications objectives
  3. Perform sufficient in-depth design of one or more candidate architectures to enable near-term science return

- Decadal Survey gave clear direction on SBG Observing priorities:
  1. Terrestrial vegetation physiology, functional traits, and health
  2. Inland and coastal aquatic ecosystems physiology, functional traits, and health
  3. Snow and ice accumulation, melting, and albedo
  4. Active surface changes (eruptions, landslides, evolving landscapes, hazard risks)
  5. Effects of changing land use on surface energy, water, momentum, and C fluxes
  6. Managing agriculture, natural habitats, water use/quality, and urban development

- SBG Science and Applications Traceability Matrices (SATM): ESAS and HyspIRI provide well-defined observables and products
- SATM Science Objectives, required capabilities and applications are traceable and provide performance criteria in the Value Framework
- Value Framework will assess each candidate architecture by performance, cost and risk value criteria
- Selected architectures from the Value Framework will then be further developed in preparation to support an MCR

SBG Work Flow

NASA HQ
Dave Jarrett
Woody Turner
Ben Phillips
Paula Bontempi

Center Executive Steering Committee
Ryan Spackman- NASA ARC
James Irons- NASA GSFC
Randy Friedl- JPL Chair
David Young- NASA LaRC
Gary Jedlovec- NASA MSFC

SBG Study Coordinator
Jamie Nastal- JPL

International Collaborations Coordinator
Chip Miller- JPL

Research and Application Team
Dave Schimel- JPL, Coordinator
Betsy Middleton- GSFC
Science Steering Committee
Working Groups:
- Algorithms
- Cal/Val
- Modeling
- Applications
- Requirements & Traceability

Architecture Teams

Architecture Formulation Team
Kelley Case- JPL, Co- Coordinator
Belgacem Jaroux- ARC, Co-Coordinator

(A-Team Workshops for candidate architectures and detail architecture)

Phase 1: Identify Candidate Architectures
Tony Freeman- JPL, Lead
Ben Poulter- GSFC, Deputy Lead

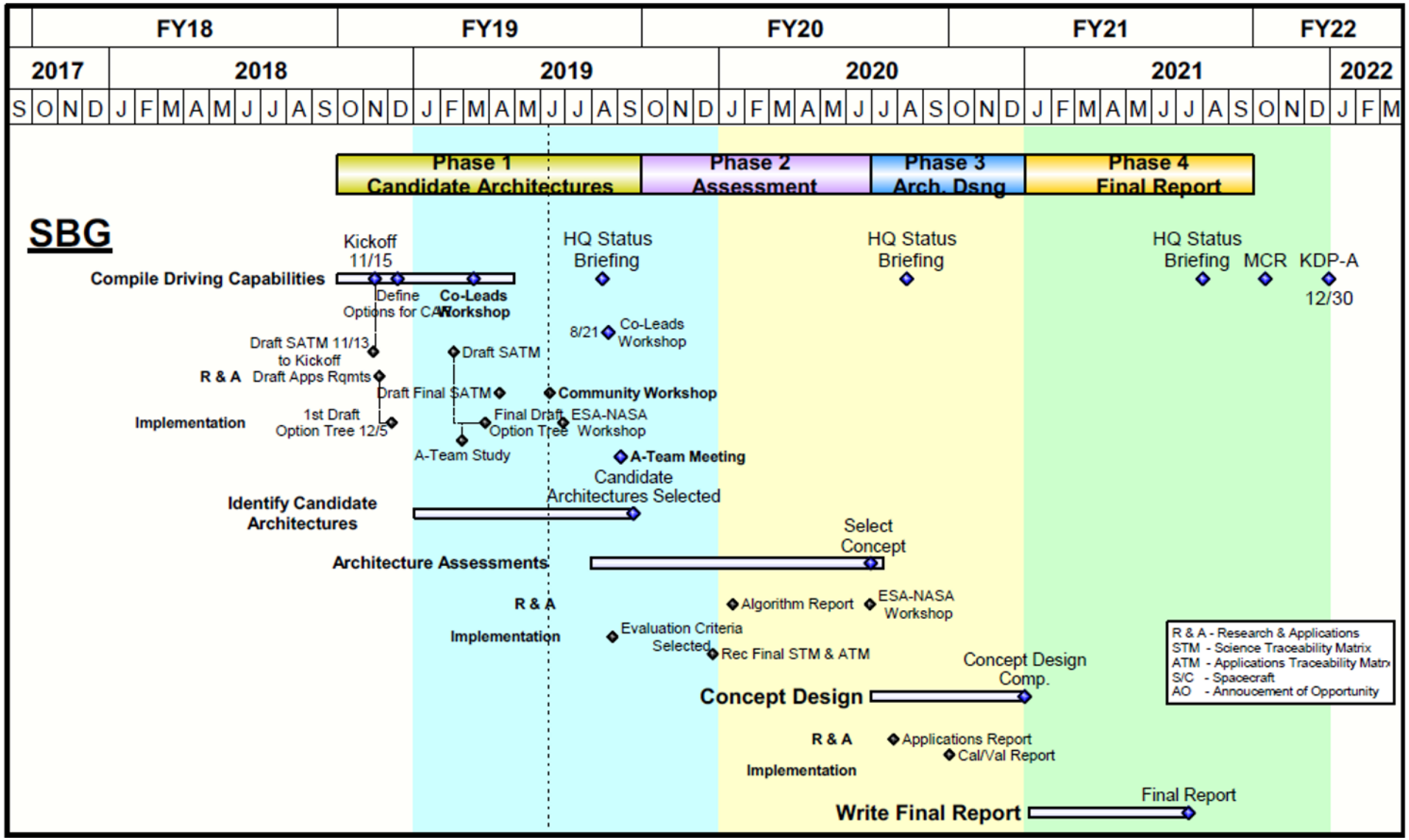
Phase 2: Architecture Assessment
David Bearden- JPL, Lead
Jim Price- LaRC, Deputy Lead

Phase 3: Architecture Design
Amit Sen- JPL, Lead
Ben Poulter- GSFC, Deputy Lead

Cost Estimation Team
Jim Hoffman-JPL, Co-Coordinator
Jordan Klovstad- ARC, Co-Coordinator

Deliverable Preparation
Phase 4: Final Report, MCR material
Jamie Nastal- JPL, Lead

SBG Study Schedule



SBG Community Workshop Objectives

- Present the approach used to develop the SBG Science and Applications Traceability Matrix and its content
- Introduce Observing System Architectures that have been identified to address the SBG Observation Objectives
- Introduce and discuss the SBG Working Group process and outcomes for algorithms, calibration and validation, applications and modeling
- Introduce and discuss the Study Value Framework and the process for using it to assess the Observing System Architectures
- Continue the tradition of scientific exchange around imaging spectroscopy and thermal imaging for ecosystems, geology, hydrology, weather, climate and diverse applications to ensure a robust research and applications community when SBG is launched

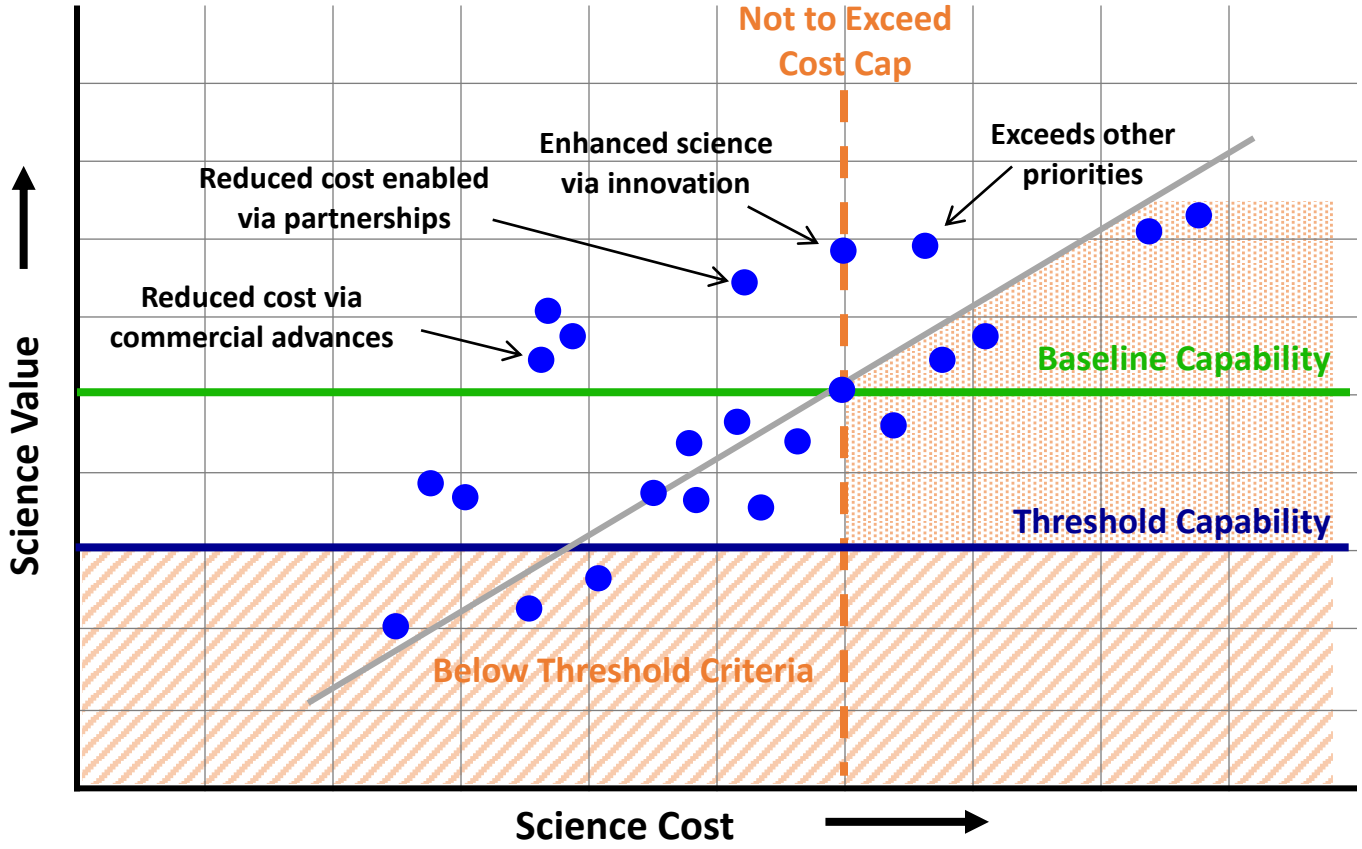
Key SATM Performance Objectives

- Derived from the Decadal Survey and shown in the SATM
- Provided in the RFI to identify all candidate observing architectures

Performance Parameters	Spectral Range	Spectral		GSD	Revisit	Coverage	Local Time for Acquisition
VSWIR	0.35 or 0.4 to 2.5µm	Resolution: 10nm or better Coverage: Continuous	SNR: VNIR: >400 SWIR: >250	30-45m	2-16 days	Global	10:30am to 1:30pm
TIR	8 to 12µm 3 to 5µm	Bands: >5 desired	NEdT: <0.2 K	40-60m	1-7 days	Global	Can vary across the diurnal cycle

The primary goal of the architecture study is to determine the extent to which any given architecture meets all, most, or some of the objectives derived from these priorities within the budget and schedule constraints recommended in the Decadal Survey. All observational architecture concepts and measurement capabilities achieving performance parameters within the ranges in this table are considered. An observational system can include any combination of a program of record, space and/or airborne systems.

Science Value Framework Assessment



Notional graphic showing Science Value vs. Cost. Gray diagonal line depicts a conventional cost performance profile. Blue dots depict individual architectures. Reduced cost to NASA may be enabled through strategic partnerships and/or innovative opportunities. Enhanced science return may be enabled through new technologies and/ or innovation. Architectures below the Threshold mission or above the cost target will not be considered.

SBG Next Steps

- Responses to recently released RFI due June 28, 2019
- ESA meetings and bi-lateral discussions with potential foreign partners (July 12-14)
- Co-Leads Working Group Meeting (August 20-21), to define Value Framework weighting with RA working groups and architecture team
- A-Team session (September TBD), to apply the Value Framework assessment to all identified Candidate Architectures, analyzing for the most feasible architectures to be further assessed in Phase 2