National Aeronautics and Space Administration



ACCESSS PACE W D R K S H D P

Increased Science Return through Rideshare

FEBRUARY 25-27, 2020

Hosted by



Organizing Committee

- Florence Tan, co-chair, NASA SMD
- Alan Zide, co-chair, NASA HPD
- George Ho, co-chair, JHU/APL
- H. Todd Smith, JHU/APL
- Rebecca Bishop, Aerospace Corp.
- James Favors, NASA HPD
- Allison Jaynes, University of Iowa
- Leonard Strachan, NRL
- William Jarvis, NASA ESD
- Charles Norton, NASA JPL
- Carolyn Mercer, NASA PSD
- Christy Hansen, NASA SMD

Introduction

- Workshop Purpose: Solicit community inputs on the creation and management of a secondary payload pipeline for NASA Science Mission Directorate (SMD) ESPA class missions
- Format: "Workshop" based to facilitate discussion. <u>Oral</u> <u>presentations</u> on the *first day only*. Their purpose is to share NASA SMD's latest policies, implementations and plans going forward with respect to utilizing ESPA class Rideshare. Two <u>Poster sessions</u>: first one (Tuesday) focuses on Users and second (Wednesday) focuses on Providers of Rideshare
- Workshop organized around 5 "Splinter" groups (i.e. sessions)
 - Each splinter group consists of 4 focused sub-groups meeting in parallel
 - Splinters are 2-hours long and focused on a single topic
 - Subsequent splinters will build on the previous splinter information discussed and captured
 - All creative ideas are welcome and should be encouraged. For example: Creative partnering between existing programs/projects to increase secondary payloads

Participants/Presentations

- The Workshop brought together over 180 participants from the four-science discipline (Astrophysics, Earth Science, Heliophysics and Planetary Science) areas within SMD.
- Scientists, engineers, instrument providers, launcher providers, and policy makers from NASA centers, government agencies, industries, research institutes, and universities all participated in the two-and-a-half-day Workshop that are organized into five splinter groups
- 40 poster presentations and numerous impromptus presentations in the splinter groups
- Splinter chairs summarized their discussions at the end of the Workshop
- A Workshop Report is being prepared for public dissemination in July, 2020

Agenda: Day 1—February 25, 2020

7:00 AM Check-In and Breakfast

8:00 AM	Welcome, Introductions and Logistics	Jason Kalirai, <i>APL</i> George Ho, <i>APL</i>	
8:10 AM	Keynote Speaker	Nicky Fox, NASA SMD	
8:30 AM	Committee for Solar and Space Physics Report	Rebecca Bishop, Aerospace Corp.	
9:00 AM	NASA Small Spacecraft Coordination Group	Florence Tan, NASA SMD	
9:10 AM	SMD Rideshare Organization Introduction and Policy	Christy Hansen, NASA SMD	
9:30 AM	NASA Launch Services Program	Albert Sierra, LSP	
9:45 AM	Break		
10:00 AM	Splinter 1: Science that Drives the Pipeline Based on Destination	LEO; GEO; Cis-Lunar; Deep space	
12:00 PM	Group Photo		
12:15 PM	Lunch		
1:30 PM	Splinter 2: Instrument Types and Configurations that Drive the Pipeline Based on Science	Earth; Heliophysics; Planetary; Astrophysics	
3:30 PM	Break		
3:45 PM	Poster Sessions / Reception	User of Rideshare	
5:00 PM	Adjourn for the day		



Splinter Structure:

ACCESS 2 SPACE

Increased Science Return through Rideshare

FEBRUARY 25-27, 2020

lational Aeronautics and Space Adminstration

Hosted by the Johns Hopkins

 Splinter 1: Science that Drives the Pipeline Based on Destination Subgroups: LEO, GEO, Cis-Lunar, and Deep Space
Splinter 2: Instrument Types and Configurations that Drive the Pipeline Based on Science Subgroups: Earth Science, Heliophysics, Planetary Science, and Astrophysics
Splinter 3: Launch Vehicle Barriers and Issues that Hinder the Pipeline Subgroups: Secondary Payload Programmatics, New Space Launch Provider Programmatics, Documentation & Interfaces, and Secondary Payload Configuration Constraints
Splinter 4: Small Spacecraft Technology Challenges that Hinder the Pipeline

Subgroups: Propulsive ESPA, Multi-Spacecraft Missions, Sub-Systems Development, and Technology Development

Splinter 5: Programmatic Challenges that Hinder the Pipeline

Subgroups: AO/MO Call Approaches, Oversight and Deliverables, Standards and Risk Assessment, and Diversity

Splinter and sub-group linkages: What approaches can be used to create a pipeline for ESPA rideshare missions?

- 1. What science studies and topics can be enabled by ESPA Rideshare? [into 2, 3a-c, 4a-d, 5a]
- 2. What science instrument types and configurations are conducive to populate the ESPA Rideshare pipeline? [from 1, into 4c-d]
 - a. How do they support science topics discussed earlier?
- 3. What are the **ESPA launch vehicle** barriers that hinder pipeline development and management?
 - a. Secondary Payload Programmatics [from 1, into 5a]
 - b. New Space Launch Provider Programmatics [from 1, into 5a]
 - c. Documentation & Interface [into 5a, 5c]
 - d. Secondary Payload Configuration [from 1, into 4a, 4b, 4d, 5a]
- 4. What are the small spacecraft barriers that hinder pipeline development and management?
 - a. Propulsive ESPA [from 1, 3d]
 - b. Multiple-SC [from 1, 3d]
 - c. SC subsystems [from 1, 2]
 - d. Technology Development [from 1, 2, 3d]
- 5. What are the NASA SMD programmatic barriers that hinder pipeline development and management?
 - a. AO/MO Call [from 1, 3a, 3b, 3c]
 - b. Oversight and Deliverables
 - c. Standardization [from 3c]
 - d. Diversity



Agenda: Day 3—February 27, 2020

	plinter #1: Science that Drives the Pipeline Based on Destination				
	Subgroup	Co-Chair #1	Co-Chair #2	Rapporteur	Splinter Lead
8:00	LEO	Blackwell	Kepko	Asher	
	GEO	Palo	Paxton	Erlandson	
	CIS Lunar	Hibbitts	Cohen	Vines	
	Deep space	Strachan	Daou	Allen	Strachan
	Splinter #2: Instrument Types and Configurati				
8:20	Subgroup	Co-Chair #1	Co-Chair #2	Rapporteur	Splinter Lead
	Earth	Dutta	Sen	Brandinger	
	Heliophysics	Bishop	Whittlesey	Но	
	Planetary	Riris	Tan	Withee	
	Astro	Garcia	Hosseini	Vines	Whittlesey
	Splinter #3: Launch Vehicle Barriers and Issues that Hinder the Pipeline				
	Subgroup	Co-Chair #1	Co-Chair #2	Rapporteur	Sub-group Lead
8:40	Secondary Payload Programmatics	Sierra	Ehrich	Trail	Sierra/Ehrich
	New Space Launch Provider Programmatics	Norton	French	Johnson	Norton/French
	Documentation & Interface	Mendoza-Hill	Adams	Henderson	Mendoza-Hill/Adams
	Secondary Payload Configuration	Zide	Scheiman	Burg	Zide/Scheiman
	Splinter #4: Small Spacecraft Technology Chall				
	Subgroup	Co-Chair #1	Co-Chair #2	Rapporteur	Sub-group Lead
9:20	Propulsive ESPA	Gasbarre	Benavides	Johnson	Gasbarre/Benavides
	Multip-SC	Spann	Wilcox	Asher	Spann/Wilcox
	SC subsystems	Yost	Favors	Henderson	Yost/Favors
	Sensor techology	Smith	Desai	Allen	Smith/Desai
10:00	Break				
	Splinter #5: Programmatic Challenges that Hin	der the Pipelin	e		
	Subgroup	Co-Chair #1	Co-Chair #2	Rapporteur	Sub-group Lead
10:20	AO/MO Call	Mercer	Breed	Jarvis	Mercer/Breed
	Oversight and Deliverables	Benna	Thurman	Burg	Benna/Thurman
	Standardization	Delmont	Turner	Trail	Delmont/Turner
	Diversity	Bishop	Hansen	Vines	Bishop/Hansen
11:00	General Discussion				



Personal takeaways

- First workshop dedicated to bring scientist, engineers, launch providers, and policy makers together
 - "I thought I knew everything.. but I didn't know we can do that."
 - "When's the next meeting?"
- Abundant of science ideas, and rideshare enables different thinking on how to close the science
 - Constellation
 - Long term monitoring (i.e. continuity)
 - High risk mission
- Standardization
 - Less choice, 7-11 vs Starbucks coffee
- Secondary payloads need better information early
 - Identify and select secondary payloads early
- ESPA class rideshare has tremendous potential to NASA for science and science technology development

Somebody else takeaways

- Splinter 1: Science that Drives the Pipeline Based on Destination
 - There is plenty of science to be done with small spacecraft missions
- Splinter 2: Instrument Types and Configurations that Drive the Pipeline Based on Science
 - There are many instruments that can be used with small spacecraft, some of which have already flown on prior missions
 - Splinter 3: Launch Vehicle Barriers and Issues that Hinder the Pipeline
 - There are proven technical solutions to launching small missions as secondary payloads, but there are still some programmatic issues to be worked out. Small launch vehicle providers may provide a good alternative for some missions.
- Splinter 4: Small Spacecraft Technology Challenges that Hinder the Pipeline
 - Small Spacecraft for Earth orbiting applications are quite capable and there is a lot to build off of from industry.
 - More work is needed to develop technologies for Deep Space SmallSat missions. The community is realizing that these types of missions are going to be more difficult than what they are used to.
- Splinter 5: Programmatic Challenges that Hinder the Pipeline
 - There are likely better ways to solicit rideshare missions earlier as part of the primary mission proposal call.
 - Discussion on cost caps for deep space missions in particular would be useful in the near future.

ACCESS 2 SPACE W D R K S H D P

Next Steps

Workshop Report:

May 1 Complete Draft Report and send out for comments to Subgroup co-chairs

May 15 Receive all comments from co-chairs

May 22 Incorporate co-chair comments into write up

- June 5 Provide report to Upper Level Management for review
- June 12 Consolidate comments from Upper Level Management into write up

June 26 Export control review received

July 1 Post document



W O R K S H O P

Increased Science Return through Rideshare

FEBRUARY 25-27, 2020

National Aeronautics and Space Adminstration

> Hosted by the Johns Hopkins Applied Physics Laboratory

NASA

Thank you