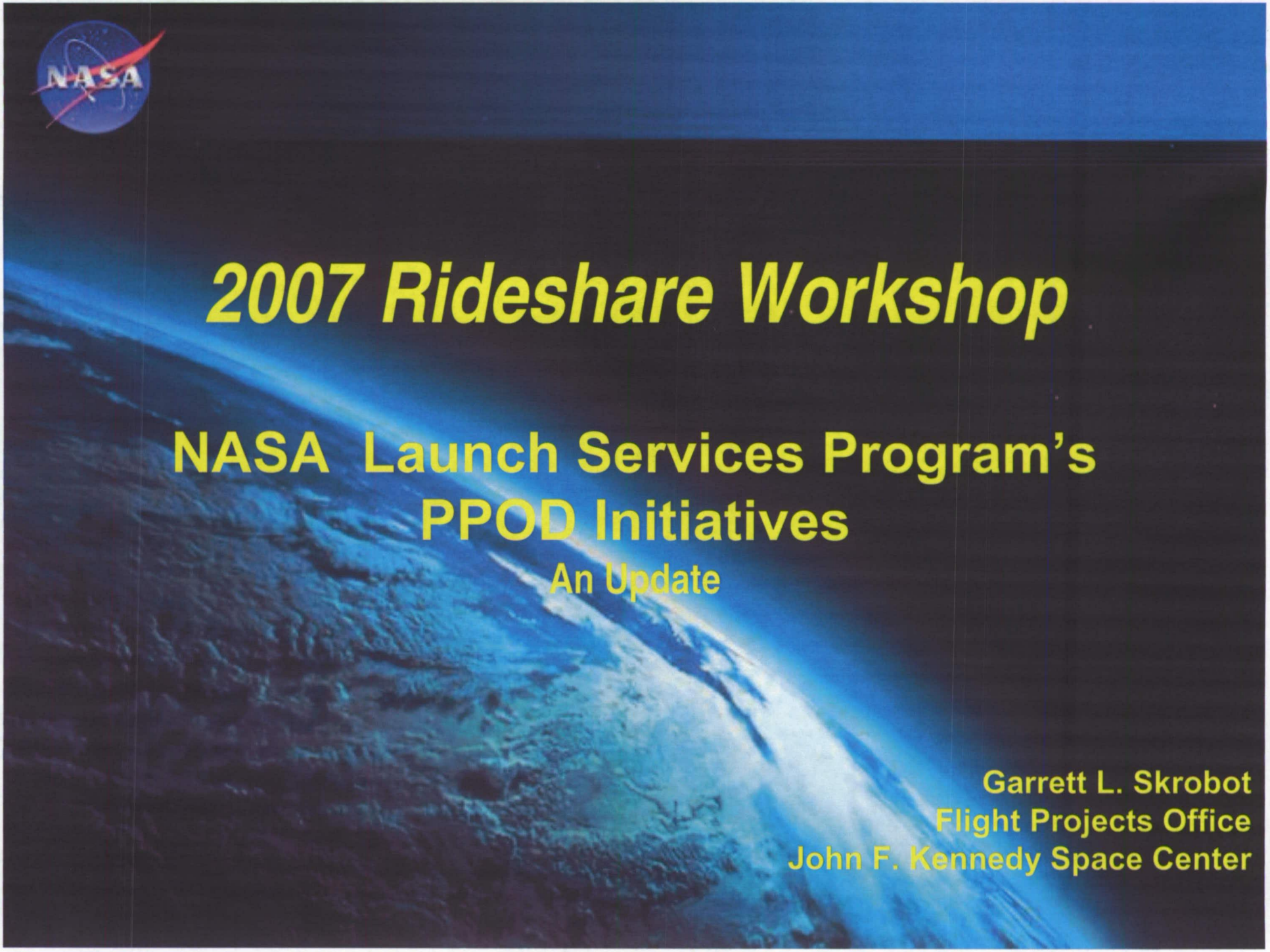
2007 Rideshare Workshop
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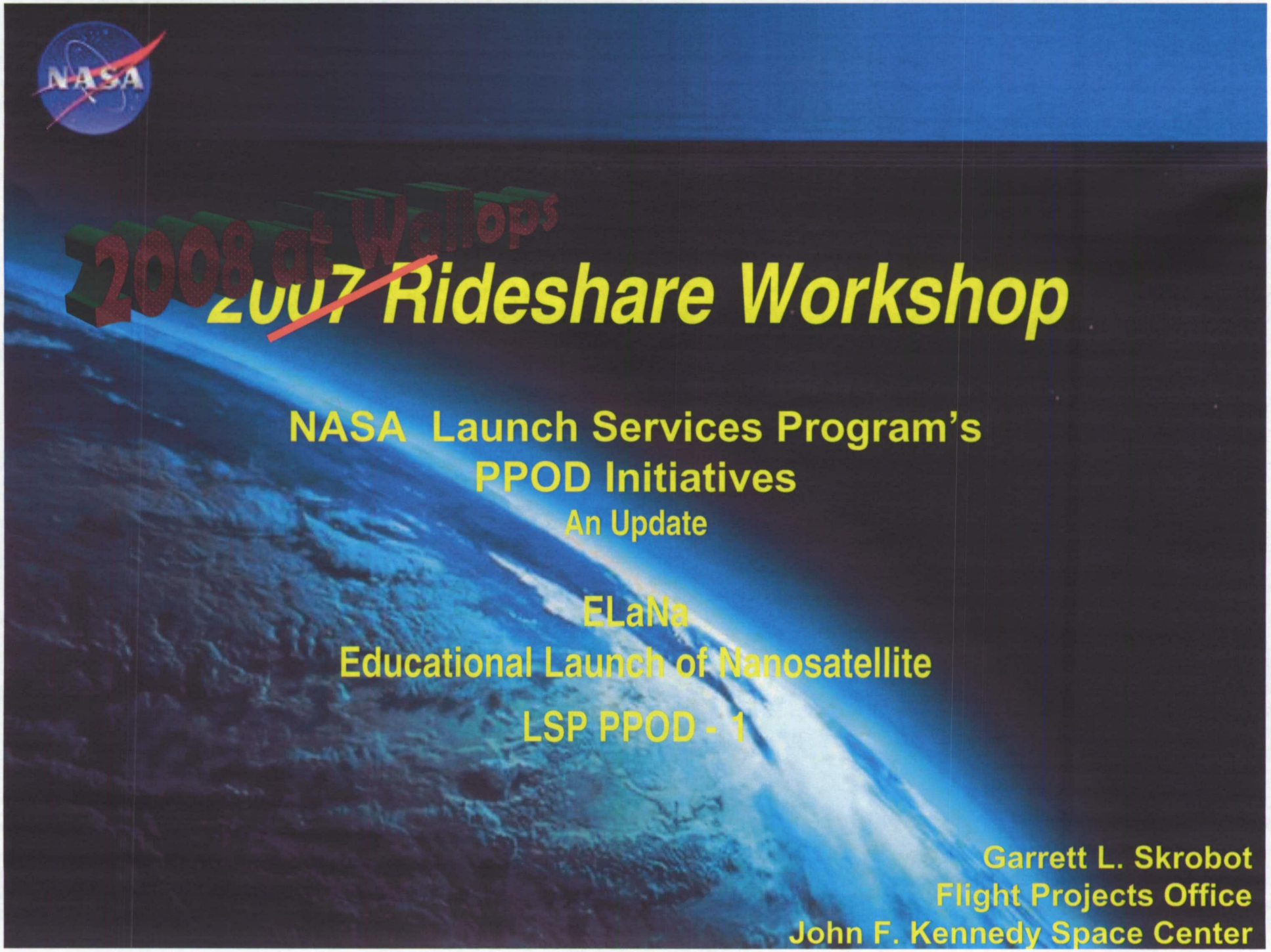
2008 at Wallops
2007 Rideshare Workshop
NASA Launch Services Program's
PPOD Initiatives
An Update
ELaNa
Educational Launch of Nanosatellite
LSP PPOD - 1
Garrett L. Skrobot
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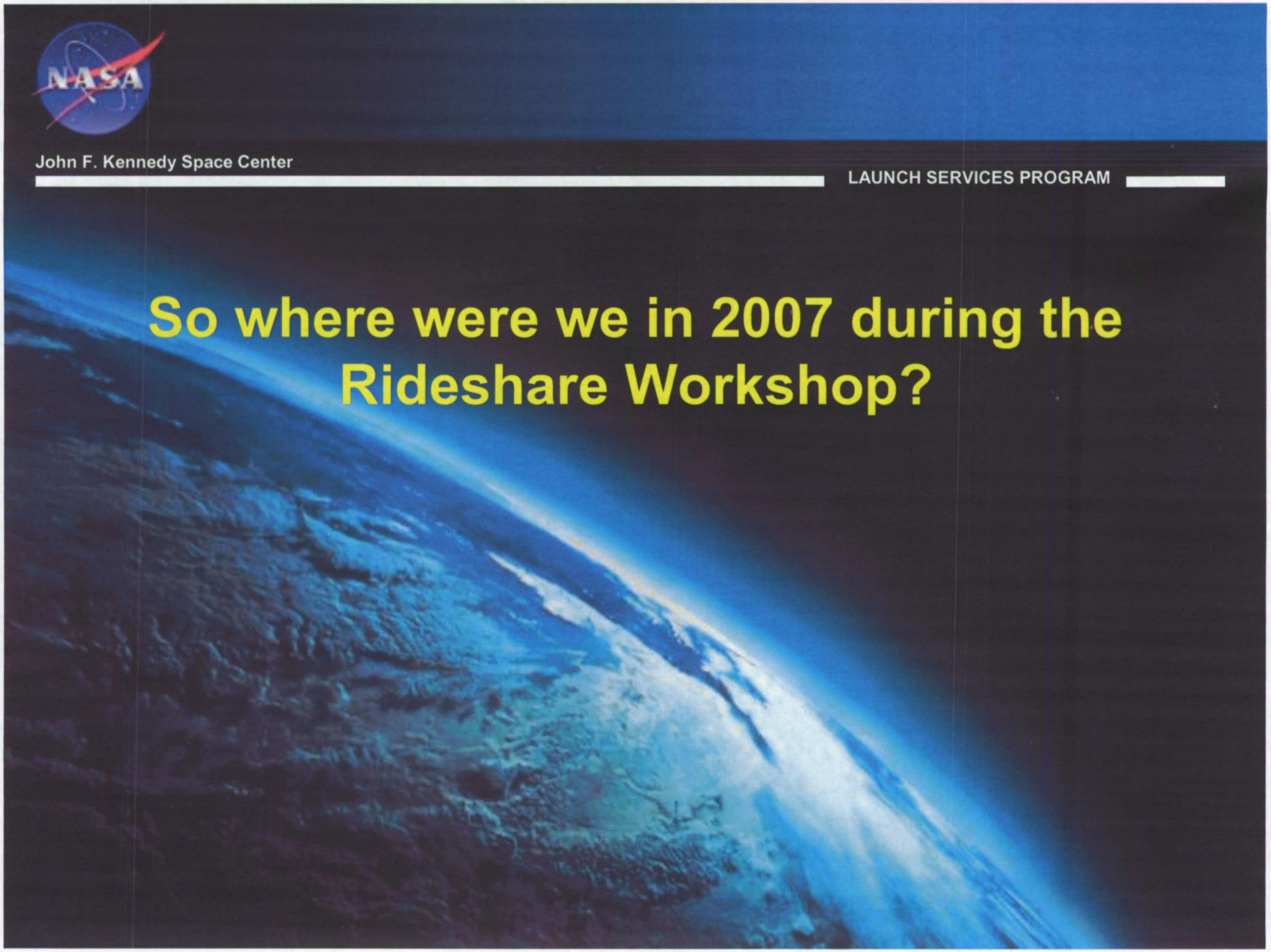
John F. Kennedy Space Center

So where were we in 2007 during the Rideshare Workshop?



At the Sheraton

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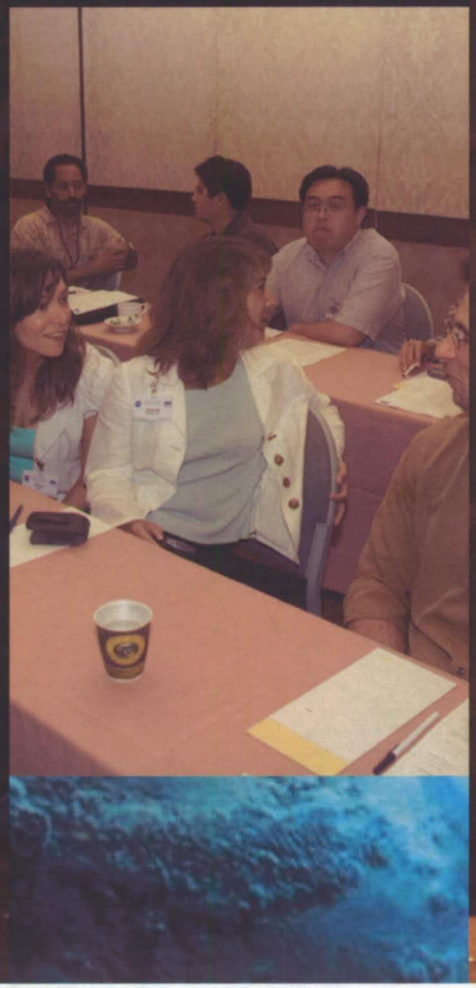

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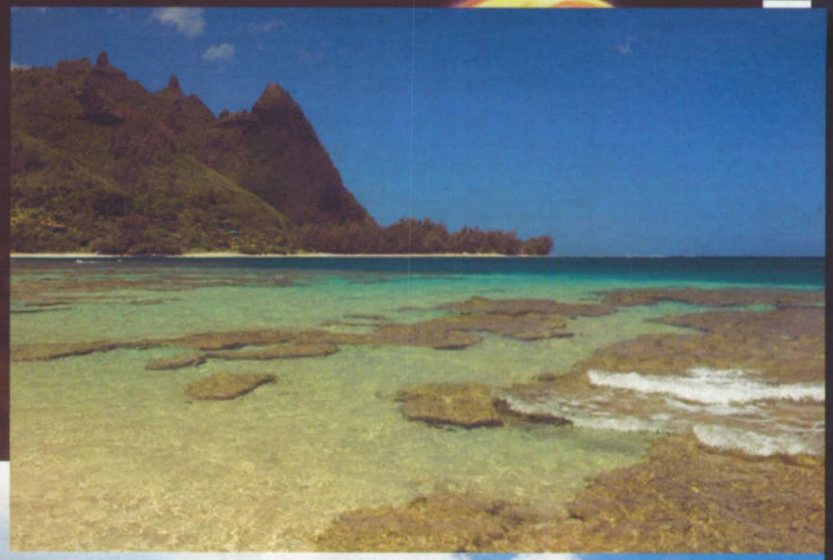

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2007 Studies

LSP Management has given direction to go forward and investigate how we can fly the PPOD system on ELVs

So, how are we going to do this?

March 2007 – Submitted Statement of Work to ULA Atlas to develop a method to integrate PPODs on the Atlas V

- This study was kicked off on April 23 with the first out brief at the end of June
- Current plan is to complete the Atlas V development and integration, then start the Delta IV effort

April 2007 - Started working with Orbital Sciences Corporation in developing a method to integrate PPODs on the Taurus XL

- Statement of Work has been sent to Orbital Sciences requesting a proposal to integrate PPODs on Taurus

So where are we today and where are we going over the next year?

Atlas V

ULA provided LSP with a concept of placing four PPODs on the C22 adapter on the forward end of the Atlas V

The plan was to perform the development in phases

PDR then CDR and Final Full Scale Development and Integration

The idea was that this could reduce risk in the development and bring down cost

After reviewing the concept and cost associated to develop the system, LSP elected not to continue with the deployment at this point in time due to cost

Taurus XL

LSP has contracted Orbital Sciences Corporation to develop a system to fly PPODs on the Taurus XL

Two NASA missions are being targeted to fly PPODs, OCO (Dec 08) and Glory (Mar 09)

OSC has complete the PDR for the PPOD Development and LSP held this review as a LSP Engineering Review Board (ERB)

The current schedule shows that OSC will conduct the CDR in August with PPOD integration to be performed in Nov 2008

PPOD

In support of the OCO mission, LSP has placed Cal Poly on contract to provide the PPOD and Integration of the selected CubeSats

LSP is working with Cal Poly in the development of CubeSat to PPOD and PPOD to L/V ICD's to verify all the requirements are captured

CubeSats

LSP put a call in to Cal Poly to ask "What university CubeSats will be ready to fly at the end 2008 to early 2009?"

The Idea is that the first NASA LSP PPOD mission would focus on university CubeSats to advance space education

Cal Poly provided a list of seven university CubeSats who indicated they could support an December 2008 mission

- Of these seven, six indicated that they would be ready

With six CubeSats saying they will be ready with only three slots available, a selection of the three CubeSats would have to be made from the six with the other three becoming backup CubeSats

LSP is in the process of performing the selection of the three CubeSats by visiting each of the CubeSats and having them perform a systems review.

2008

- **Top-level activities for PPOD on Taurus**
  - ✓July 2007– Taurus/PPOD Feasibility study complete
  - ✓September 2007 – LSP PRCB Approval to continue with PPODs
  - ✓October 2007 – Informational Briefing to OCO and Glory
  - ✓February 2008 – ATP with Orbital to start PPOD Integration
  - ✓March 11, 2008 – Conducted PPOD review with A-Train and Projects
  - ✓April 3, 2008 – Conducted PPOD review with SMD
  - ✓May 16, 2008 – PPOD/Taurus Preliminary Design Review (NASA ERB)
  - •June 2 - 12 2008 – CubeSat System Reviews
  - •June 10, 2008 – Cal Poly PPOD PDR/CDR (NASA ERB)
  - •June 13 – 20 2008 - Selection Team makes recommendation of three CubeSats to take to FPB
  - •June 23 – 27 2008 SMD reconvenes for PPOD and Mission Process
  - •July 1, 2008 – Present PPOD to Flight Planning Board
  - •August 22, 2008 – PPOD/Taurus Critical Design Review (NASA ERB)
  - •September 2008 – CubeSat and PPOD Mission Readiness Reviews
  - •October 15, 2008 CubeSat integration at Cal Poly
  - •November 15, 2008 – PPOD with CubeSat delivery to VAFB for integration onto OCO Taurus XL
  - •December 15, 2008 – Launch of OCO with ELaNa LSP-1 PPOD

LSP PPOD/CubeSats Status

From the Project Briefing and A-Train Review, LSP receives several Risk Reduction Activities to mitigate before flying PPODs on OCO and Glory

1. Couple Loads Analysis
2. Orbital Debris Assessment
3. Relative Motion Study
4. RF Hazard Analysis
5. Secondary Payload Processing
6. CubeSat Track
7 Collision Avoidance

The LSP PPOD team briefed SMD on the status of PPOD. From this review, LSP was asked to include an Independent review team and a NASA Center that builds Spacecraft to the PPOD team to oversee the processes being performed.

ELaNa
LSP PPOD-1/CubeSat Integration Flow for OCO

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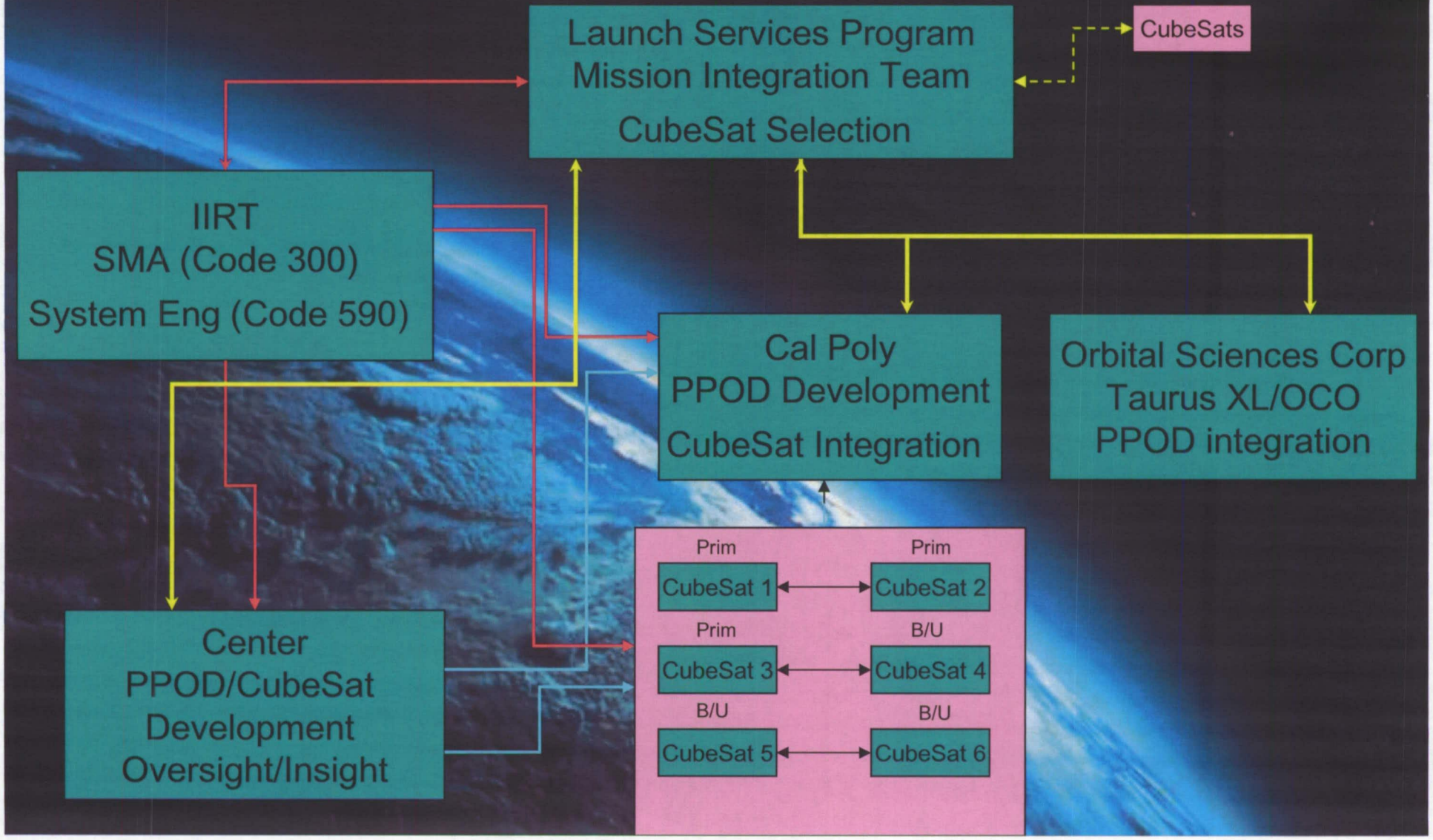


PPOD/CubeSat/Secondary Challenges

Convincing the primary that the auxiliary payload has been well analyzed and the mission risk mitigated

Secondaries being ready and on time to fly on the day of launch

Understanding of what is required from the secondary for inputs into testing and reports

Knowing that they are the secondary and not a primary

Funding, there are costs associated with integrating a secondary to the launch vehicle

Interface requirement, the secondary initially indicates that all that is required is a separation circuit and later asking for a quick disconnect purge system in a Class 10K clean room

Future Work

So, where does LSP go over the next year with Secondaries?

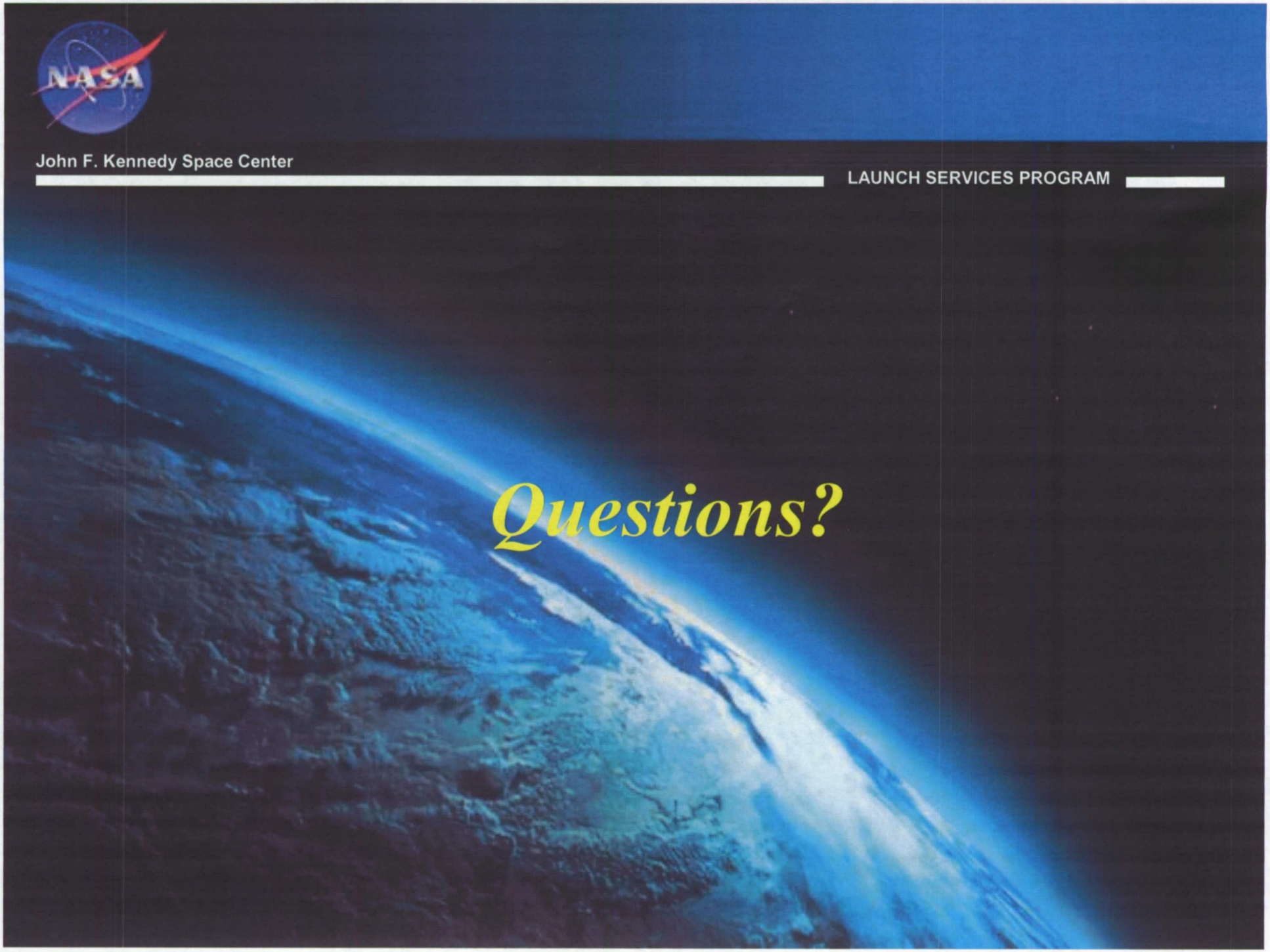
Identify the possible need by the Agency/Government to fly Pico/Nano spacecraft and how we will do this

Work closely with other NASA Centers and the Air Force to bring their expertise to Secondaries

Continue the development of a manifesting policy for PPODs/CubeSats/Secondaries

Continue to work with our Launch Services contractors and new launch vehicle to implement, not only PPOD systems, but other secondary systems

Continue to partner with the US Air Force in the development of an agreement to fly PPODs and ESPA Payloads on Air Force missions with available margin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Questions?