2007 Rideshare Workshop

Launch Services Program

John F. Kennedy Space Center
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Flight Projects Office

Mission Statement

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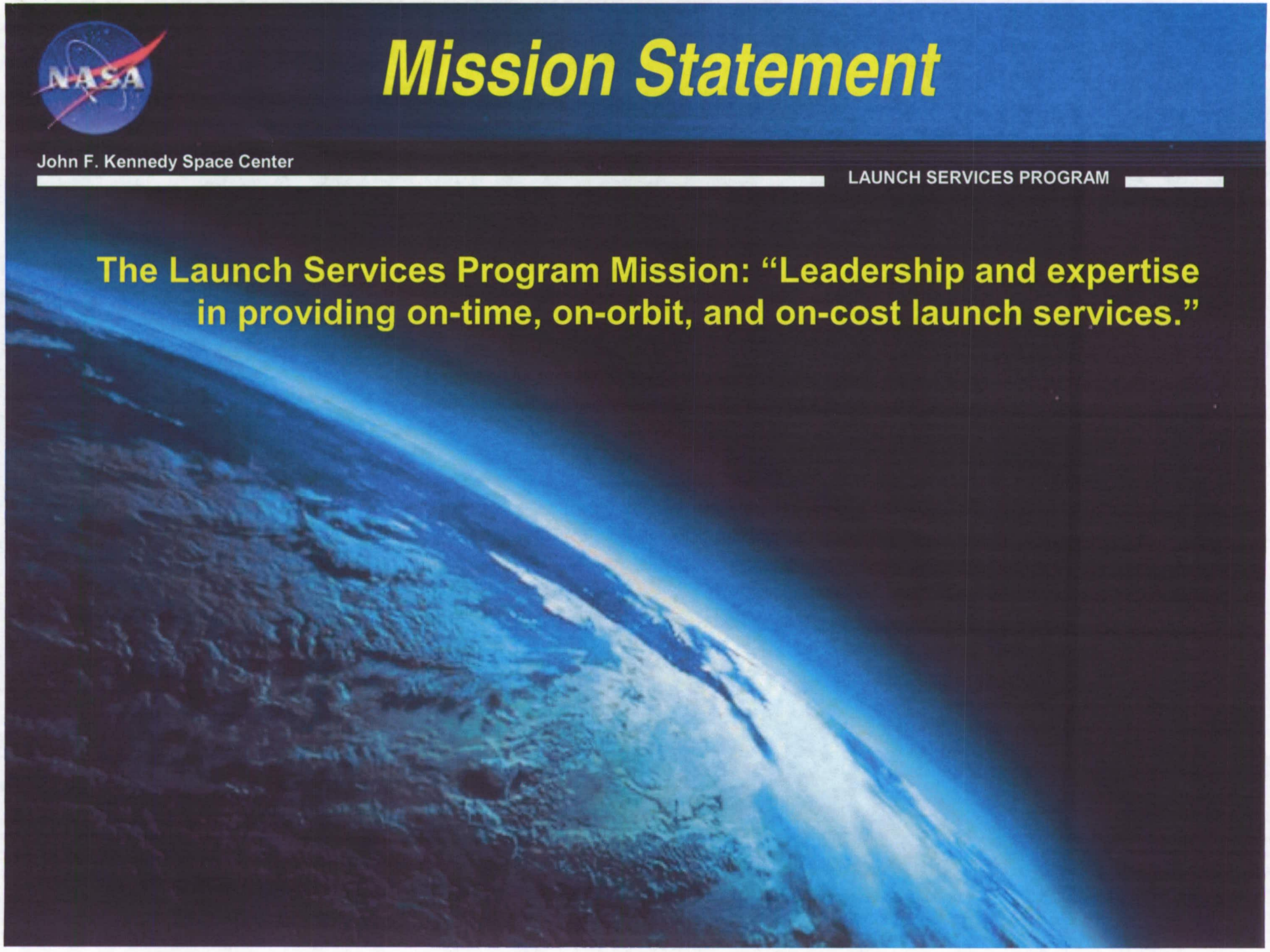
LAUNCH SERVICES PROGRAM

The Launch Services Program Mission: "Leadership and expertise in providing on-time, on-orbit, and on-cost launch services."



Launch Services Program

- **The NASA Launch Services Program (LSP)**
  Procures and manages rides into space for NASA spacecraft, NASA-sponsored payloads, or other government space missions as requested.

Launch Services Program

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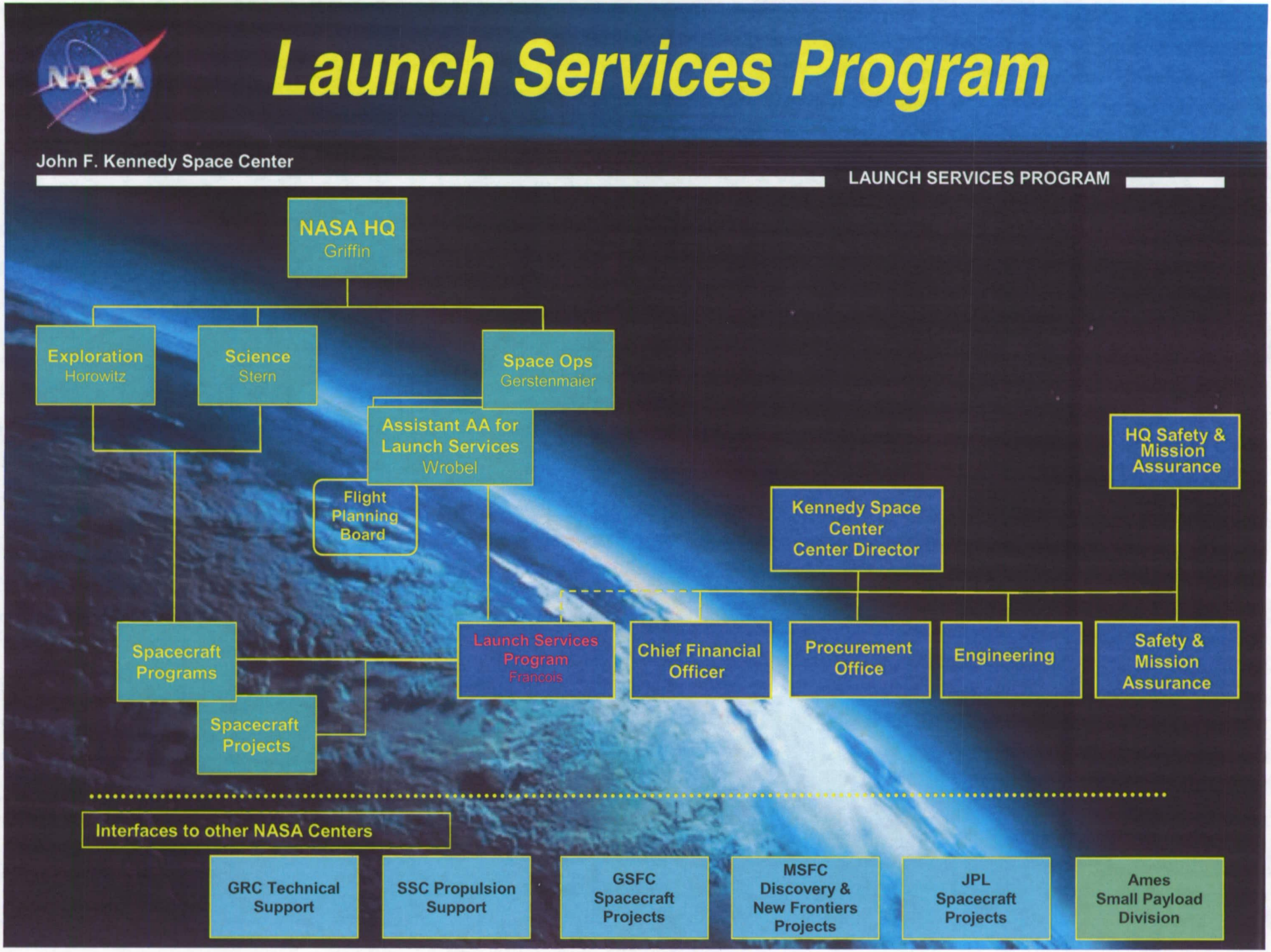

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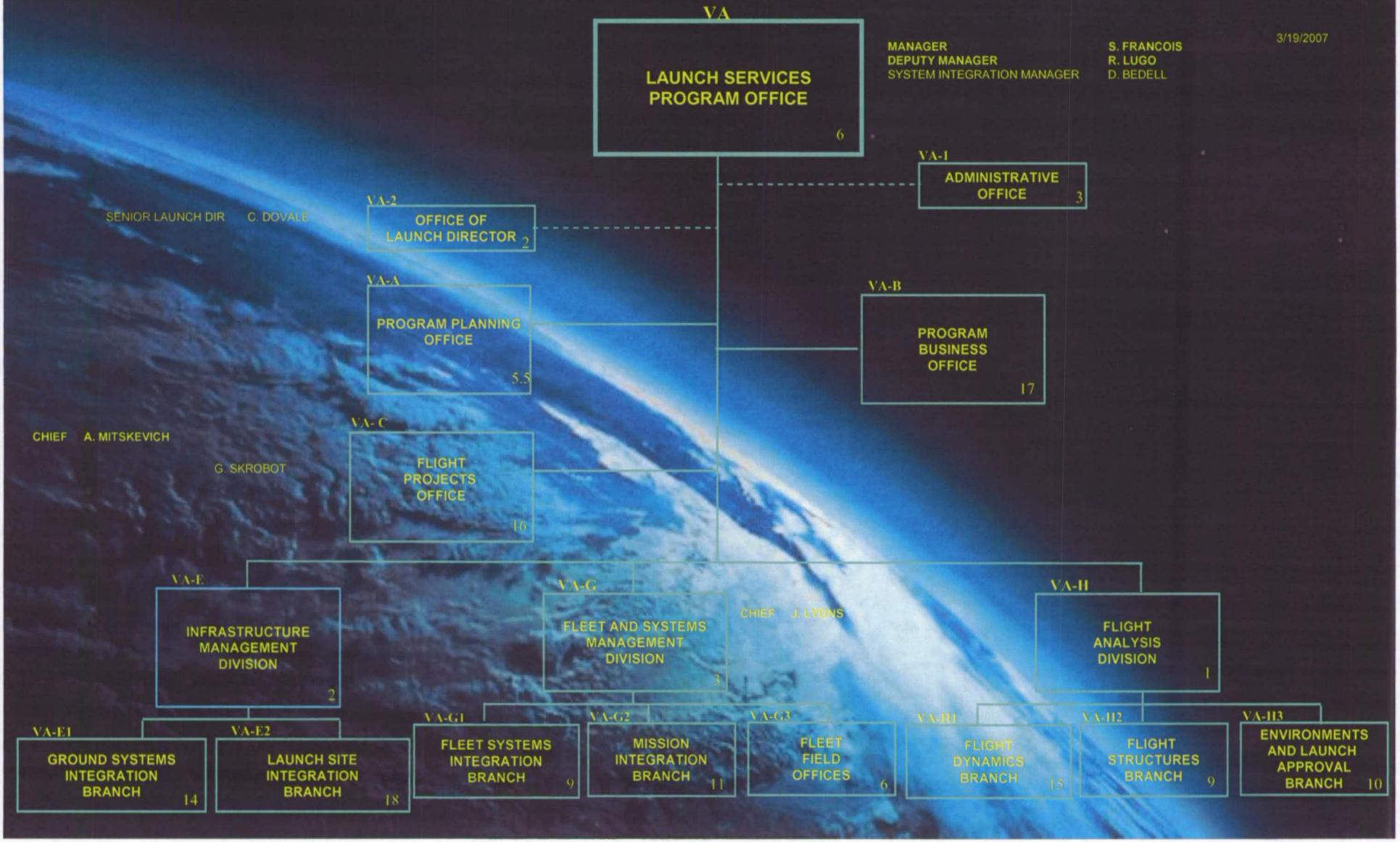

Programmatic Acquisition and Management of Launch Services

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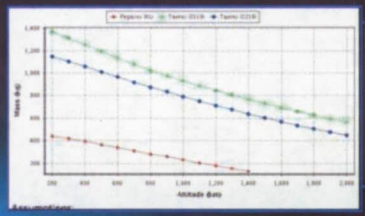
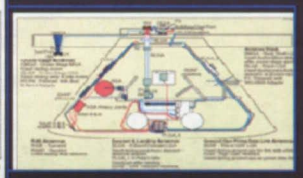
Acquire commercial launch services

Verify and validate mission engineering

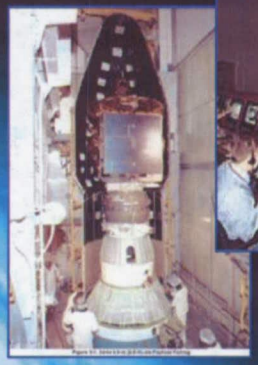




Insight and approval of production, integration, testing and processing

Provide technical, operational, contractual, budget and business knowledge and expertise to future missions

Perform NASA launch management activities



Certify launch systems for NASA use

Establish strategic partnerships and make investments to satisfy Agency Launch Service needs

Perform Spacecraft launch site operations

Launch Locations

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Launch Vehicles

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Heritage Vehicles

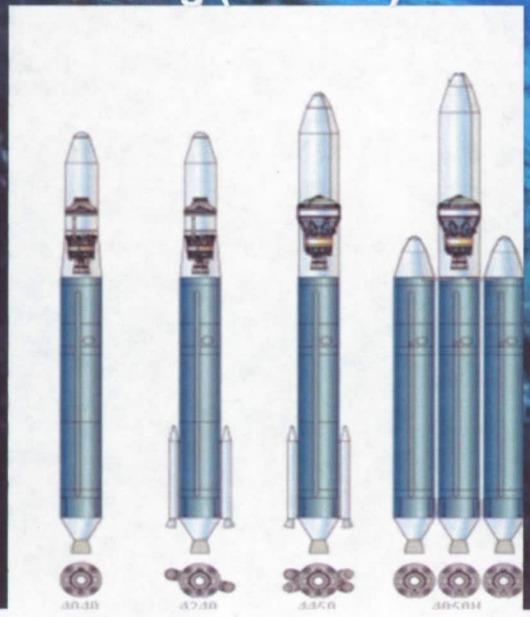
Pegasus

Taurus

Delta II

EELVs

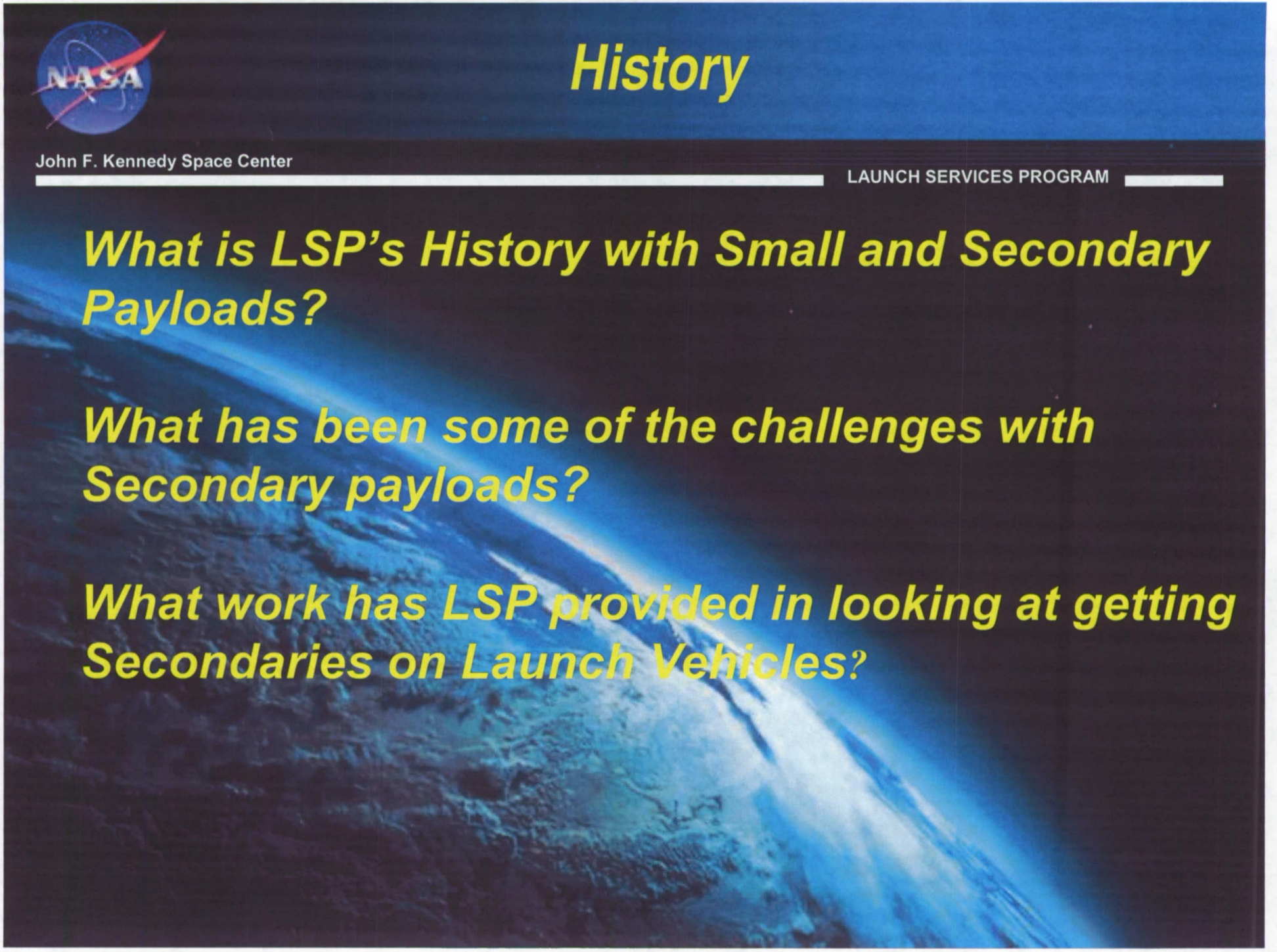
Boeing (Delta IV)



Lockheed Martin (Atlas-V)

Growth / Evolution

Growth / Evolution


History
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What is LSP's History with Small and Secondary Payloads?
What has been some of the challenges with Secondary payloads?
What work has LSP provided in looking at getting Secondaries on Launch Vehicles?

Recent History of NASA's Small Satellite Missions

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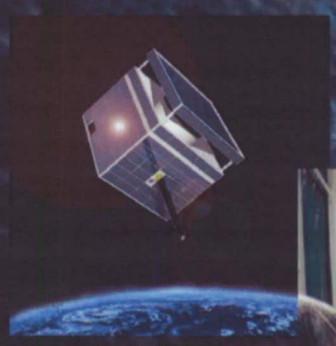
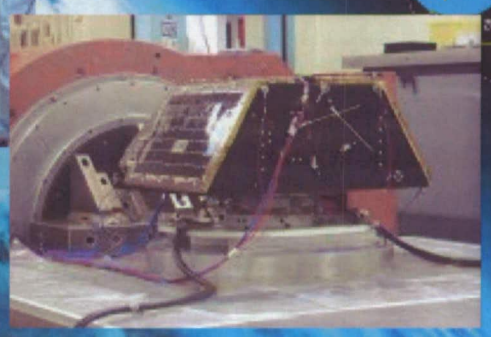
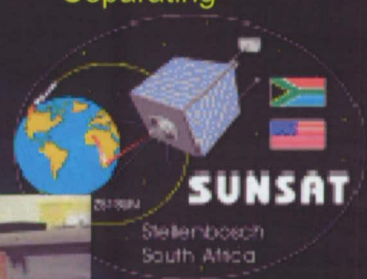
Secondary Payload	Approx. Mass	Date	Vehicle	Primary (Customer/Payload)	Type
DUVE	102 kg	07/92	Delta II/6925	NASA/GEOTail	2 Non Separating
SEDS-1	45 kg	03/93	Delta II/7925	USAF/NAVSTAR II-19	Tether
PMG	55 kg	06/93	Delta II/7925	USAF/NAVSTAR II-21	Tether + Diagnostics
SEDS-2	50 kg	03/94	Delta II/7925	USAF/NAVSTAR II-21	Tether
SURFSAT	35 kg	11/95	Delta II/7920	CSA/RADARSAT	2 Non Separating
SEDSAT	40 kg	10/98	Delta II/7326	NASA/DeepSpace-1	Separating
Orsted	61 kg	02/99	Delta II/7920	USAF/P-91	Separating
Sunsat	63 kg	02/99	Delta II/7920	USAF/P-91	Separating
ACRIM	120 kg	10/99	Taurus (T-4)	Commercial/KOMPSAT	APC/Separating
Munin	6 kg	11/00	Delta II/7320	NASA/EO-1&SAC-C	Separating
Starshine 3	100 kg	09/01	Athena I	USAF/PICOSAT/PCSat/SAPPHIRE	Separating
QuikTOMS	375 kg	10/01	Taurus (T-6)	Commercial/OrbView-4	APC/Separating
CHIPS	~85kg	01/03	Delta II/7320	NASA/ICESat	Mini-DPAF/Sep
ST-5	~120kg	03/06	Pegasus	NASA	Separating







Secondary Challenges

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 cost associated with integrating a secondary to the launch vehicle.

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

Past Studies and Agreements

February 1992 – Memorandum of Agreement between Space System Division Delta II Systems Program Office and NASA Orbital Launch Services Project for Secondary Mission on Delta II was signed

August 1992 – First Copy of the Secondary Payload Planner's Guide on Delta II was provided

February 2002 – Feasibility Study was preformed to integrate P-Pods and BioNanoSat as a s Secondary on Pegasus

April 2003 – Secondary Payload Capability Studied conducted for both Atlas V and Delta IV

2005 – LSP provides funding for Wallops to develop the Multi Payload Adapter to support possible DARPA launch opportunities

January 2006 - Request for Launch Services Proposal (RLSP) for the Lunar Reconnaissance Orbiter (LRO) mission included requirements for accommodating at least one secondary payload mission, with options to accommodate multiple payloads up to a total capability of 1000 kgs

Present Studies

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

So, How are we going to do this?

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

- This study 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 Science Corporation in developing a method to integrating PPods on the Taurus XL

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

If we implement the PPod system on this ELV's, are there opportunities to fly this system?

NASA Launch Services Manifest

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FPB Approved 01/18/07
Release 05/01/07

	2007				2008				2009				2010				2011				2012				2013				2014			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Secondary (S)																																
Delta (D/S)															ST-9 9/2010																	
Taurus (T/S)																																
Small Class (SC)						A IBEX (P) 6/15/08				ST-8 (SC) 2/28/09																						
Pegasus (P)																																
Taurus (T)	AIM (P) 4/25/07 A					OCO (T) 9/15/08 A																										
						GLORY (T) 12/15/08 A																										
Medium Class (MC)																																
Delta 732X Series (D3)	A THEMIS (D) 2/17/07					A OSTM (D3) 6/15/08												LDCM (MC) 7/2011								MIDEX - 7 (MC) * 11/2013						
Delta 742X Series (D4)						TBD (DH) 10/15/08 F												Discovery 11 (MC) * 9/2011														
Delta 792X Series (D)						KEPLER (D) 11/1/08 A																DISCOVERY - 12 (MC) * 11/2012										
Delta 792X H (DH)		A DAWN (DH) 6/30/07								A NOAA-N' (D3) 2/1/09									LUNAR ORBITER - 2 (MC) 10/2011													
	PHOENIX (D) 8/3/07 A									A NPP (D) 4/30/09																						
	STSS B2010 RR (D) NET 11/08/07 A									F AQUARIUS (D3) 7/14/09									MARS SCOUT 2 (MC) 11/2011 *													
		STSS (D) 11/25/07 A								WISE (D3) 11/1/09 F																						
		GLAST (DH) NET 12/14/07 A																														
Intermediate (IC) / Heavy Class (HC)						GOES-O (DIV) 4/2008				GOES-P (DIV) 4/2009								Juno (IC/HC) 8/11/2011														
Atlas V (AV)						SDO (AV) 8/1/08 A												RBSP (IC) * 8/2011								MMS (IC) * 10/2013						
Delta IV (DIV)										A MARS SCIENCE LAB (AV) NET 9/15/09																						
Delta IV Heavy (IVH)						LRO/LCROSS (AV) 10/31/08 A													LUNAR ROBOTICS LANDER (IC) 10/2011													

Potential Secondary Opportunities

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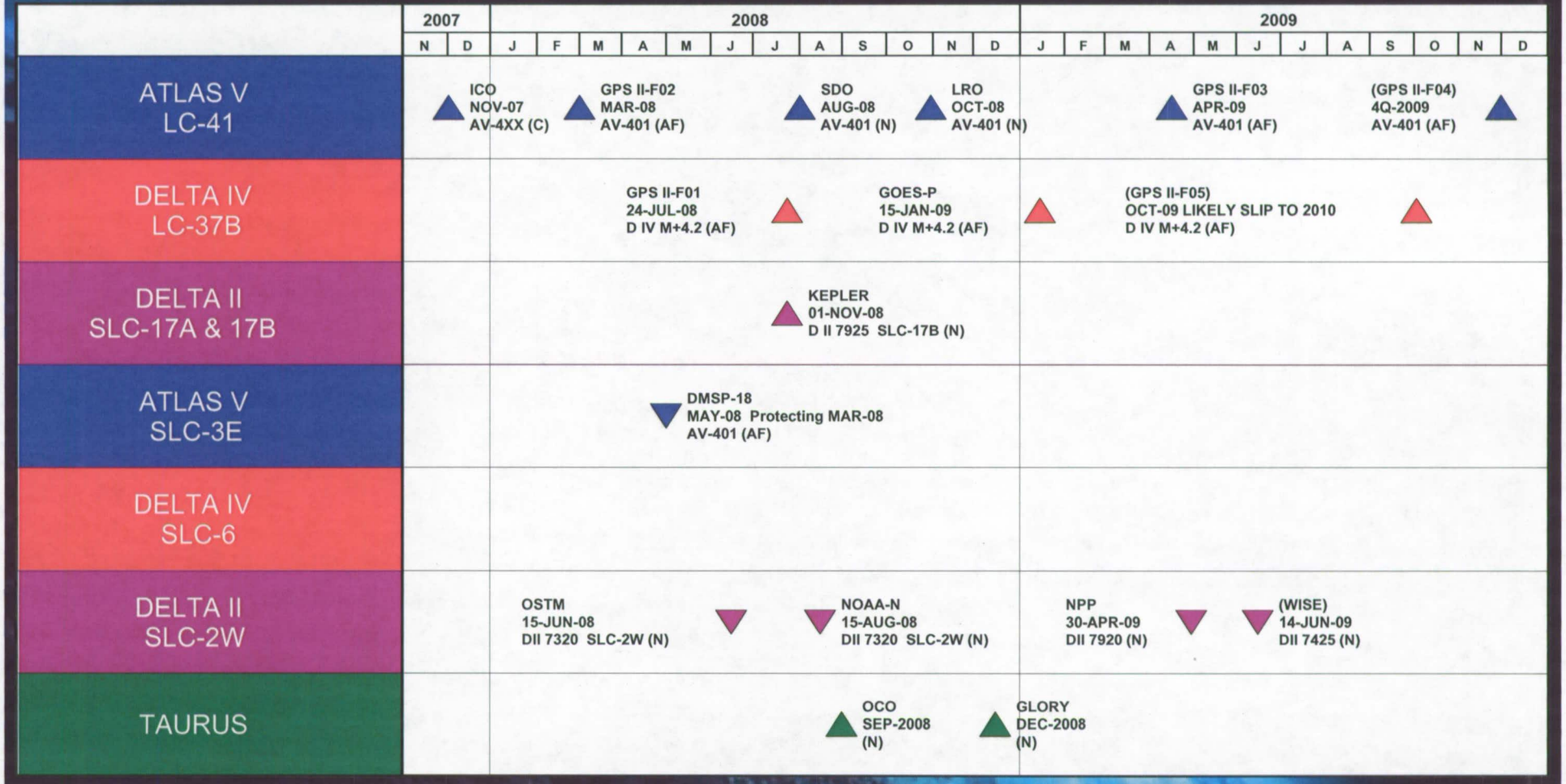
Potential Secondary Opportunities



Future Work

So, where does LSP go from here with Secondaries?

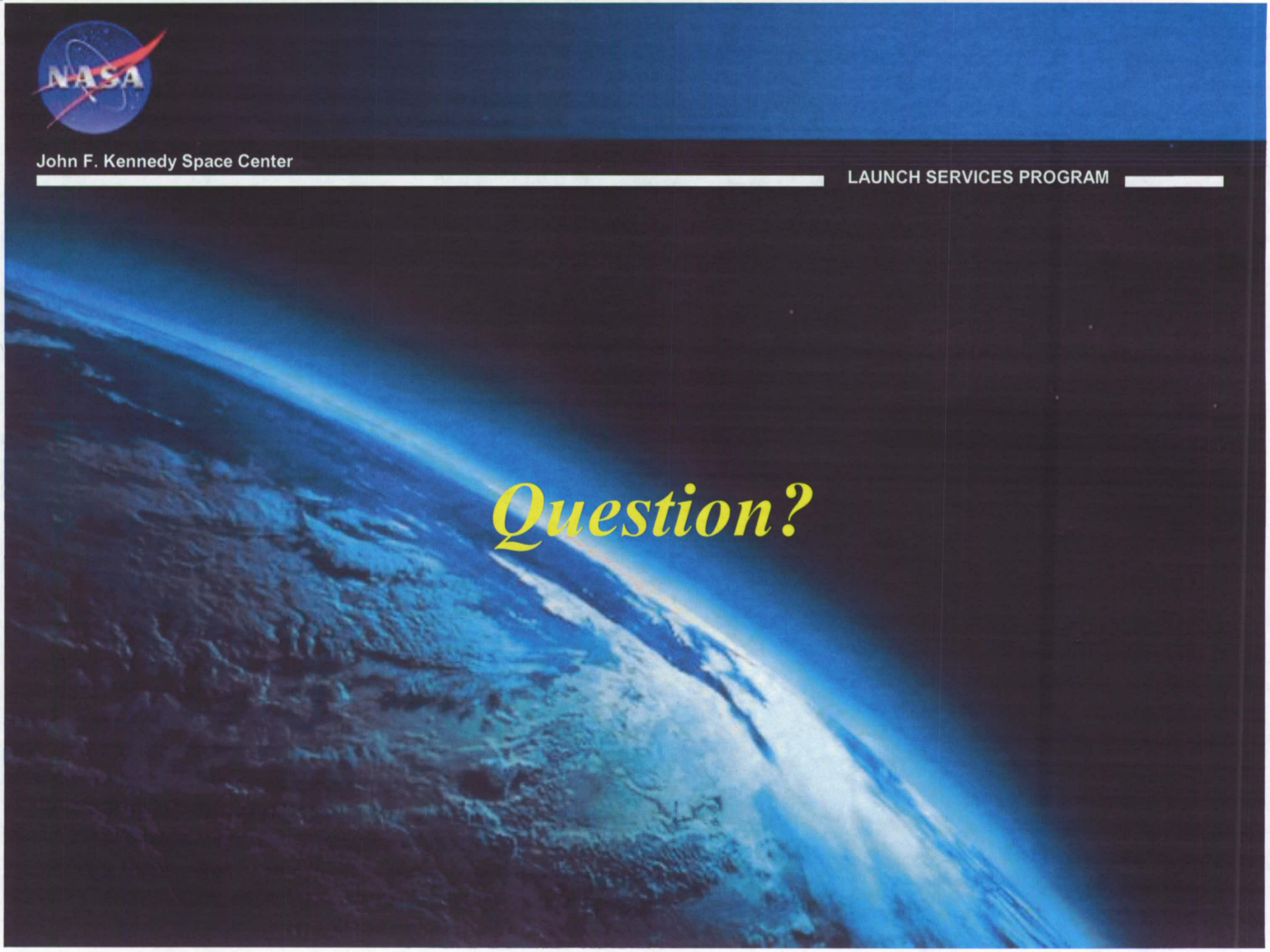
Identify the possible need by the Agency/Government to fly Pico/Nano spacecraft and how we will do this.

Develop a manifesting policy for PPODs/Cubesats

Continue to work with ULA Atlas and OSC in the implementation of the PPod system on both the Atlas V and Taurus XL to support a possible first flight in 2008

Start discussion with US Air Force in the development an agreement to fly PPODs on Air Force mission with available margin.

Study any new launch vehicle entering the market as a potential carrier for small/secondary spacecraft.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Question?