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“Working RideShare for the U Class Payload”

**RideShare Workshop 2014
JPL**

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NASA



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What is a U Class Payload?

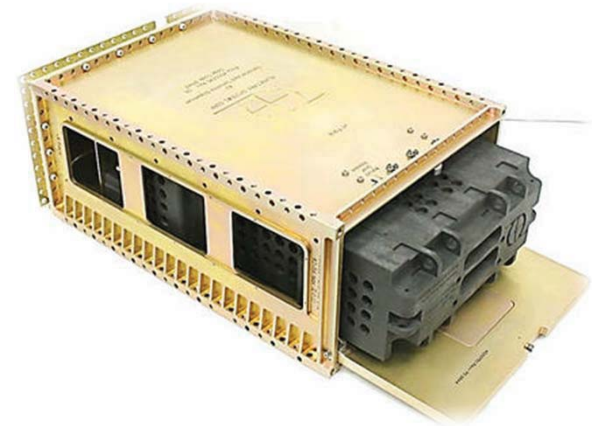
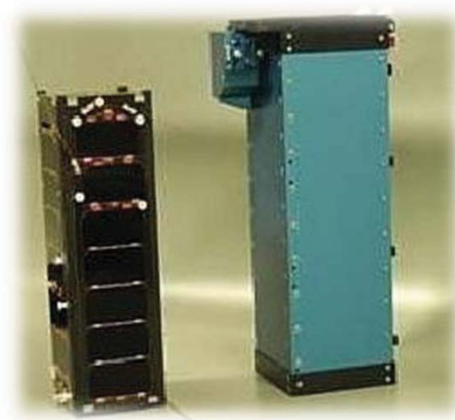


U class are payloads that are of a form factor of the 1U CubeSats – 10cm Cubed

We know of the 1U...3U...6U...12U...etc. and the carriers they use

P-POD CSD ISIS POD NLAS

There may be a standard for the CubeSat however the LV interface is not standard....\$\$\$\$\$



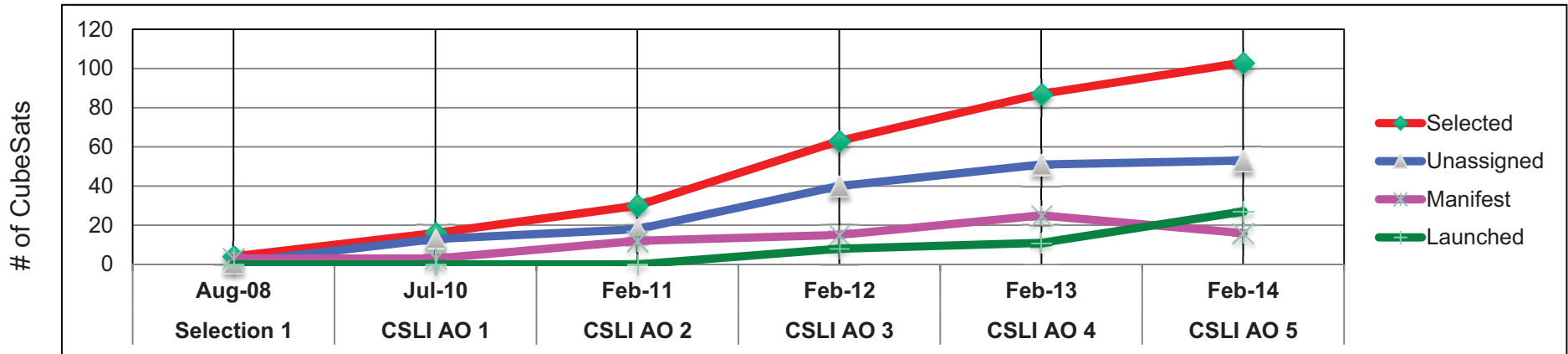


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U Class Popularity



Over the past three years these small spacecraft have grown in popularity in both the Government and the Commercial market.



This chart shows an increase in the number of NASA CubeSats selected and yet a very low launch rate. Why the low launch rate?

- Funding, more money = more launches
- CubeSat being selective about the orbit
- CubeSats not being ready

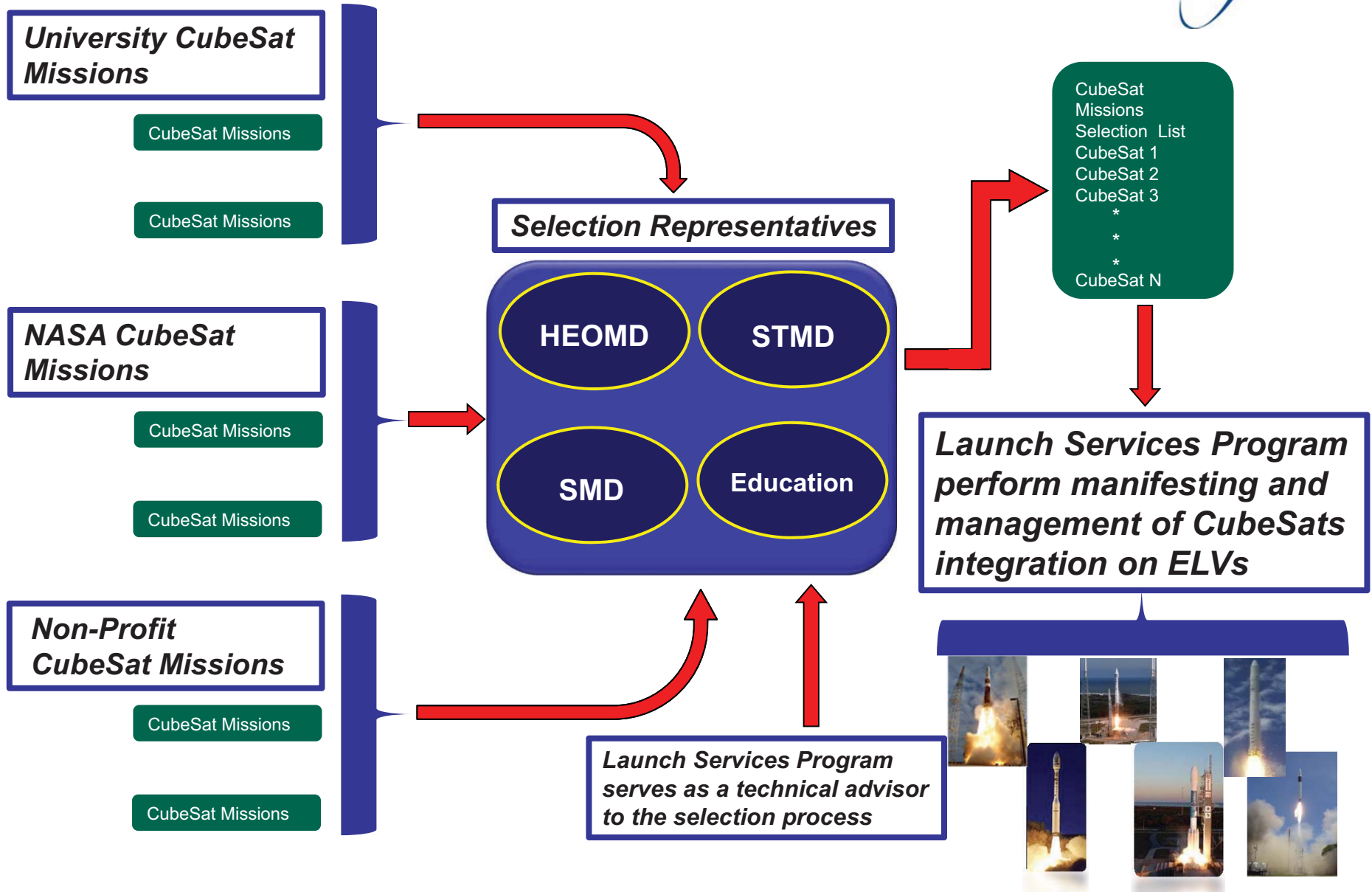
This trend is expected to continue with current manifesting practices.

The backlog of CubeSats continues to grow including more sophisticated science missions with unique orbit requirements.



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CubeSat Launch Initiative Selection Process





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2014



ELaNa Missions Manifest

LV Provider	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	
NASA 	 ELaNa I March 4, 2011 Glory – Taurus 3 CubeSats	 ELaNa III Oct 28, 2011 NPP – DII 5 CubeSats		 ELaNa V Apr 18, 2014 CRS#3 – F9 5 CubeSats	 ELaNa X Nov 5, 2014 SMAP – DII 3 CubeSats	 ELaNa Aug, 2016 GOLauncher 3 Carriers	 ELaNa NLT 2 nd Q 2017 2 JPSS-1 – DII 3 Carriers	 ELaNa 1stQ 2017 ICESat II – DII 3 Carriers
	ISS				 ELaNa VIII Oct 2014 ORB-3 1 CubeSats	 ELaNa IX NET Apr 2015 ORB-4 3 CubeSats		
NRO 		 ELaNa VI Sept 13, 2012 NROL-36 – DII 4 CubeSats		 ELaNa II Dec 5, 2013 NROL-39 – AV 4 CubeSats	 ELaNa XI NET Apr 2015 AFSPC-5 4 CubeSats	 ELaNa XII NET Aug 2015 NROL-55 – AV 2 CubeSats		
ORS 				 ELaNa IV NET 11/19/13 ORS-3 11 CubeSats	 ELaNa VII NET Oct 2014 ORS-4 2 CubeSats			
Commercial					 ELaNa 2015 CubeSats	 ELaNa 2016 CubeSats	 ELaNa 2017 CubeSats	



Manifested



In Work

Launched	Manifested	Un-Assigned
32	16	53



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Missions and Systems



ELaNa I	ELaNa II&VI	ELaNa III	ELaNa IV	ELaNa V	ELaNa VII	ELaNa VIII
Taurus (Minotaur C)	Atlas V NRO Developed	Delta II	Minotaur I ORS Developed	Falcon 9 (Aft End)	Super Strypi ORS Developed	ISS
Third Stage One 3U Carrier	ABC/CuLite Eight 3U Carriers	Second Stage Three 3U Carriers	NASA Ames dispenser Eight 3U Carriers	Aft End Surf Board Six 3U Carriers	NASA Ames dispenser Eight 3U Carriers	NanoRacks





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Missions and Systems

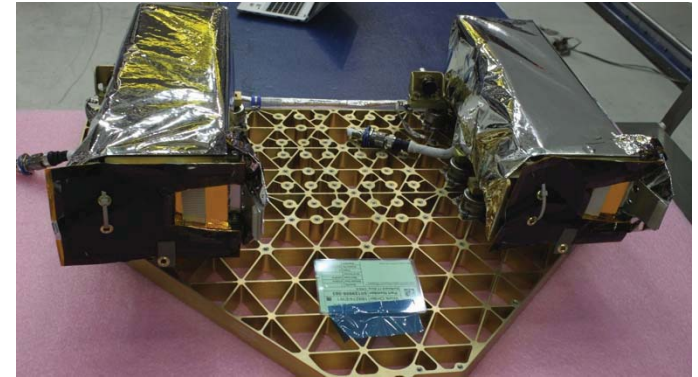


The vision of the Small Payload Team at LSP is to have the capability to deploy the U class payload off every US launch vehicle as a rideshare.

This will provide additional opportunities for the U class payload.

Currently we have capability to deploy from Atlas V, Minotaur-C, Delta II and Falcon 9.

Development work needs to be performed on both Delta IV and Antares to complete the US Fleet.





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Missions and Systems



Not only are U spacecraft launching on rockets, they are now being deployed off of the ISS.

LSP is taking advantage of these opportunities to place CSLI CubeSats on Orbit.

Also a NanoLauncher System is in work for the dedicated launch of CubeSats.





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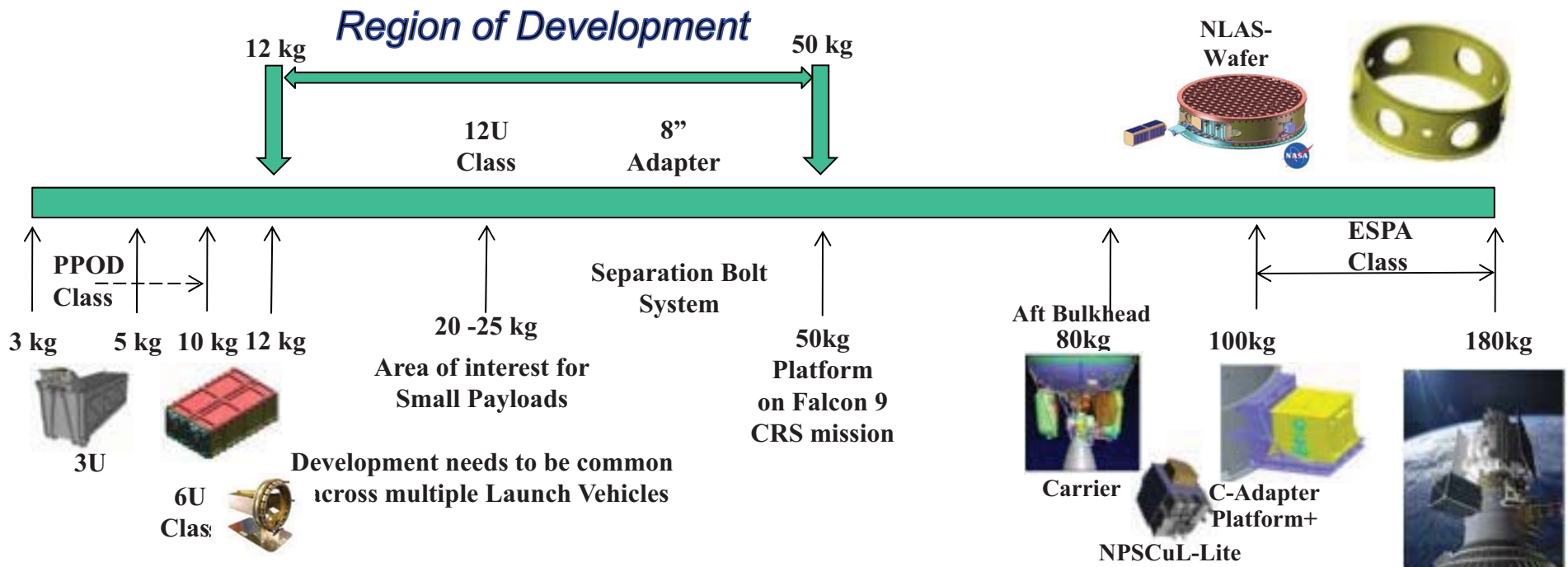
Small Payload Capabilities



LSP considers rideshare or small/secondary payloads as those payloads in the 1kg to 180 kg range

Payloads above 150kg could fly as a small payload on a commercial launch vehicle

The diagram below shows the current capabilities that have flown or are scheduled to fly in the near future.





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LSP Capabilities



LSP provides small/secondary payload integration and launch services to meet our customer's requirements.

To meet these requirements, LSP's contract mechanisms allow for the procurement of secondary/small payload services from our launch vehicle provides.

LSP continues to perform feasibility studies as well as develop small/secondary payload system on NASA ELV fleet vehicles

Review of LSP's small satellite integrated missions reveals both the number of small payloads launched and their mass regions

Mass Region	1-10kg	11-50kg	51-100kg	101-180kg	181-375kg
# Secondaries flown to date	33	3	6	3	1*

* Mission was flown in a DPAF



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Closing



So in Closing....

Is the concept of RideShare working for S/C other than the ESPA and U class?

How many 500kg to 2000kg RideShares have been coordinated and flown to date?

Are there future missions that are considering flying as RideShare?



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Questions