



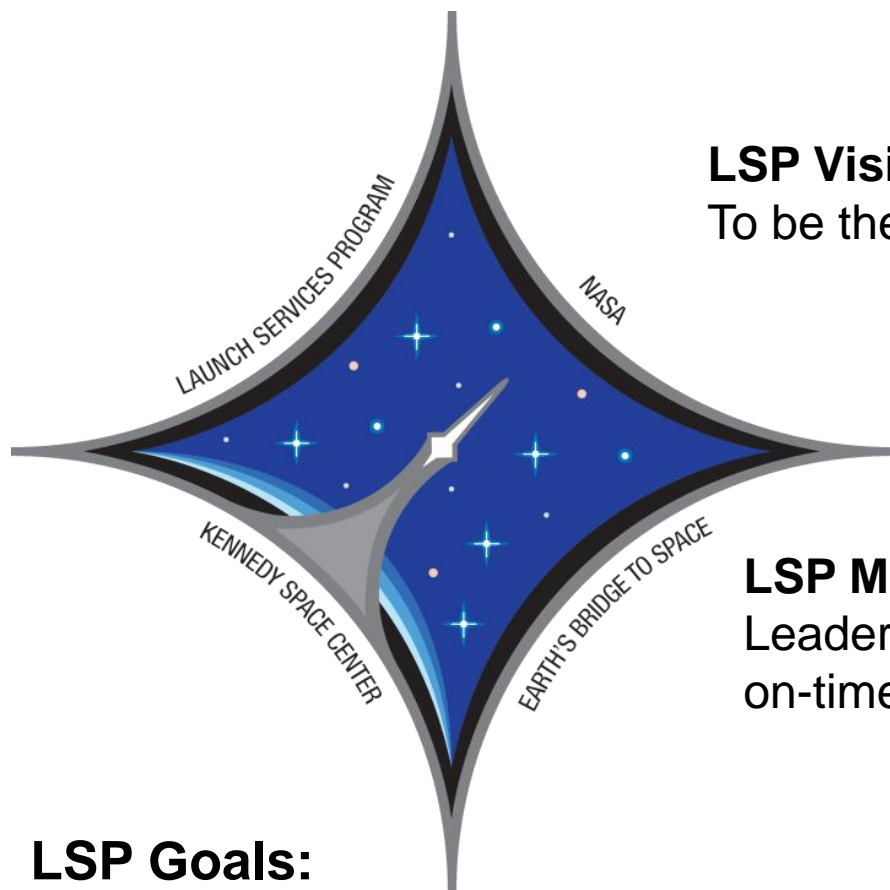
JOHN F. KENNEDY SPACE CENTER



VENTURE CLASS LAUNCH SERVICES



Mark Wiese
Launch Services Program



LSP Vision

To be the recognized leader in launch services

LSP Mission

Leadership and expertise in providing on-orbit, on-time, on-cost launch services

LSP Goals:

Goal 1: Maximize Mission Success

Goal 2: Assure Long-Term Launch Services

Goal 3: Promote Evolution of a US Commercial Space Launch Market

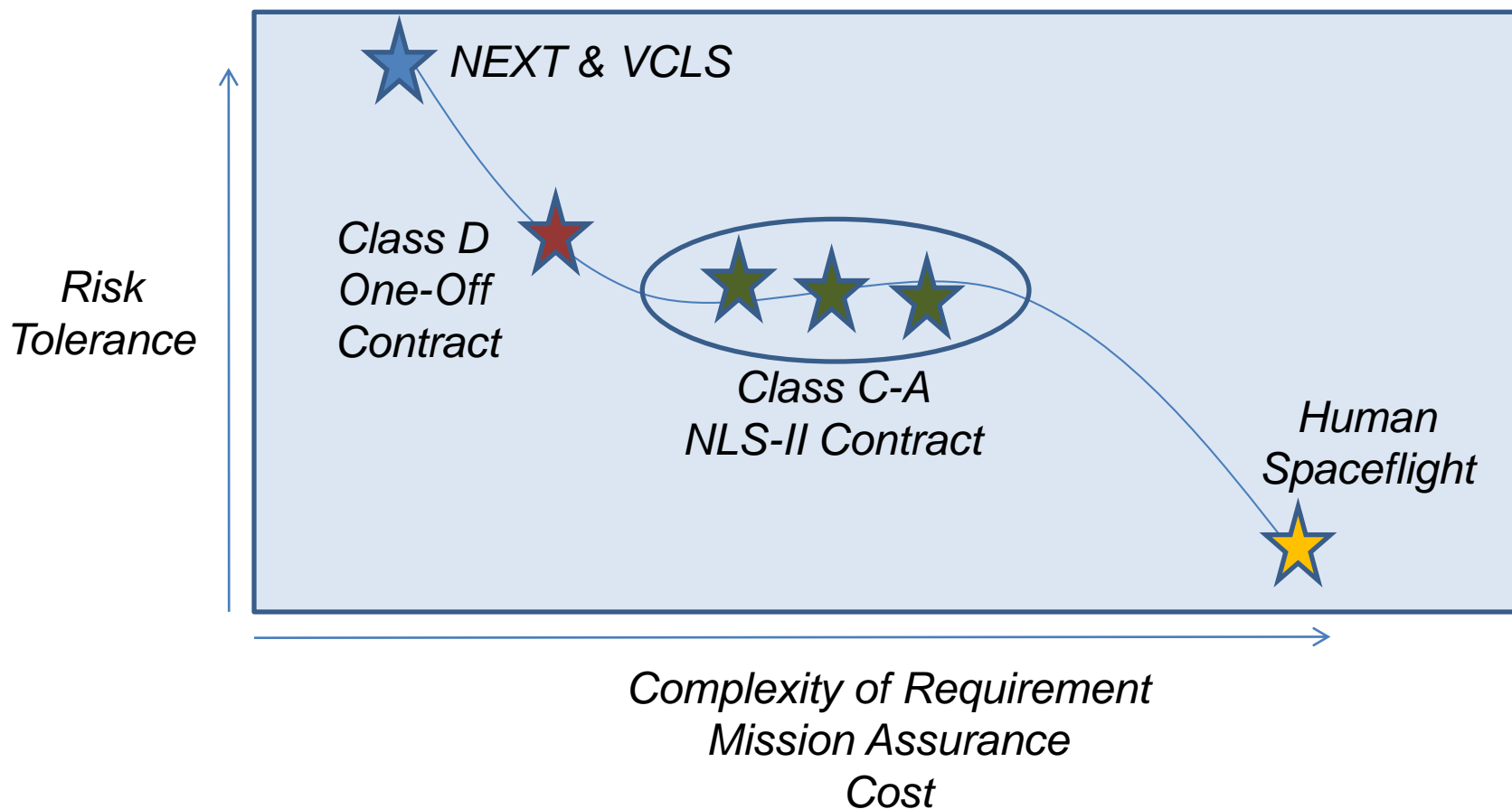
Goal 4: Continually Enhance LSP's Core Capabilities



Customer Focus



Feedback drove strategy to demonstrate contracting flexibility





JOHN F. KENNEDY SPACE CENTER

CubeSat Launch Initiative (CSLI)



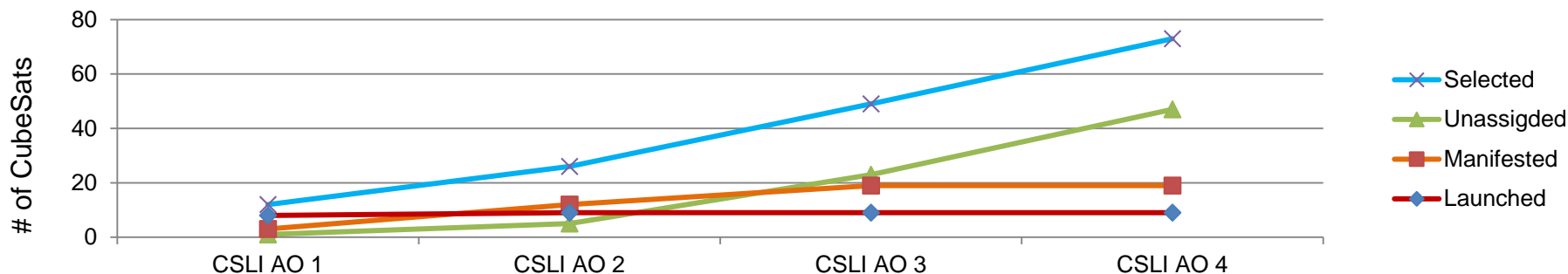
CSLI provides NASA Centers, educational & non-profit organizations opportunities to fly small satellite payloads on upcoming launches.

Graphics below represent a snapshot of CSLI selections vs. launches before LSP's Venture Class Launch Services (VCLS) contract awards

NASA CubeSat Missions			
2013	2014	2015	2016



50+ CubeSats awaiting launch opportunities





JOHN F. KENNEDY SPACE CENTER

Requirement Evolution



- Initial NEXT Contract Awarded in Fall of 2013 (w/2016 launch)
 - CubeSat's serve as primary payload, high risk tolerant
 - Contracted for 15kg to LEO
 - Industry maturing to support micro-sat commercial space
 - Multiple commercial providers attempting to be first to market
- Following award, SMD's Earth Sciences Division expresses interest to further study potential launch solutions for future Earth Venture class missions launching NET 2019
- LSP releases NEXT-XL RFI in Summer of 2014
- LSP/SMD partners on development of NEXT-XL requirement
- NEXT-XL Demo renamed to Venture Class Launch Services (VCLS), with approval of strategy, and securing of funding to award to multiple providers
 - draft RFP targeted for Spring 2015, w/award planned for Fall of 2015



JOHN F. KENNEDY SPACE CENTER



VENTURE CLASS LAUNCH SERVICES





VCLS Overview

JOHN F. KENNEDY SPACE CENTER



Attachment 03

- Firm-Fixed Price contract of a demonstration flight, with three separate providers
 - Firefly Space Systems
 - RocketLab USA
 - Virgin Galactic
- Milestone-based payment structure; limited NASA insight through milestone reviews
- Minimum 60kg to LEO (425km), orbit inclination of providers choosing (within 33 – 98 degrees), launch date no later than April 15th, 2018
- Companies responsible for Launch Vehicle development

RFP NNN15542801R
Venture Class Launch Service (VCLS)

ATTACHMENT 03 - Milestone Deliverable Descriptions and Requirements

Event	Typical Payment Months Before/After Milestones*	Payment Amount Percentage
Kick Off Meeting	NET Award	5
System Requirements Review (SRR)	NET Award + 2 Weeks	5
Preliminary Design Review (PDR)	NET SRR + 3 Months	10
Critical Design Review (CDR)	NET PDR + 6 Months	15
Qualification Testing (QT)	CDR + 3 Months	20
Qualification Data Review (QDR)	NET QT + 3 Months	10
Launch Vehicle Readiness Review (LVRR)	NLT L- 3 Months	10
Flight Readiness Review (FRR)/Launch Readiness Review (LRR) & Launch	NLT L-0	5
Post-Launch Assessment Report	NLT Launch + 2 months	20

No Earlier Than (NET)

No Later Than (NLT)

*This represents a generic scenario with limited development being done prior to award. Offerors may propose updates to the table based on their level of maturity.



CSLI Post VCLS



NASA'S CUBESAT LAUNCH INITIATIVE (CSLI)



CUBESATS are small research spacecraft called nanosatellites, built to standard dimensions of 10x10x11 cm.

CSLI provides opportunities for small satellite payloads to fly on upcoming launches to NASA Centers, educational & non-profit organizations.

less than



3 lbs.

CubeSat sizes are in standard 10X10X11 cm units, or U: 1U, 2U, 3U, or 6U, usually weighing less than 3 lbs per U.

This is about the weight of a half gallon of milk!



7 YEARS

- Proof of Concept 2008
- 1st Initiative: 2010
- 7th Initiative 2015



LAUNCHED

49

CUBESATS IN 46 MISSIONS

119

CUBESAT MISSIONS SELECTED



95%



of those selected have been offered a launch

66

UNIQUE ORGANIZATIONS



51

UNIVERSITIES



STATES SELECTED TO LAUNCH A CUBESAT

32

400



Pre-K – 8 students built the 1st CubeSat deployed into space by an elementary school in May 2016.

PAYLOAD FOCUS AREAS



67%

Technology Demonstration



50%

Scientific Research



55%

Education



JOHN F. KENNEDY SPACE CENTER

VCLS Impact



Beyond CubeSats, NASA LSP's VCLS initiative

- **Helps enable the market for low end of performance range**
- **Provides LSP early influence & insight to emerging providers**
- **Demonstrates LSP's flexibility in contracting and approach**
- **Opens the door to affordable and dedicated NASA SmallSat launches**

LSP Goals:

Goal 1: Maximize Mission Success

Goal 2: Assure Long-Term Launch Services

Goal 3: Promote Evolution of a US Commercial Space Launch Market

Goal 4: Continually Enhance LSP's Core Capabilities