ELaNa

Educational **La**unch of **Na**nosatellite

"Still Moving Forward!"

CalPoly Spring Workshop 2013

Garrett Skrobot

Mission Manager

Launch Services Program

NASA

ELaNa Project Team 2008

Project Manager — Garrett Skrobot

Mission Integration Coordinator — Kris Nelson, Jan McMillian

Mission Managers — Garrett Skrobot, Scott Higginbotham

Integration Engineering — Bill Atkinson, Brad Poffenberger, Elliott Hulscher

Business Office — Creg Raffington

Contracts — Jennifer Dorsey

Matrixed Engineering — Electrical, Mechanical, Loads, Stress, Dynamics, Controls; Thermal Contamination, Materials
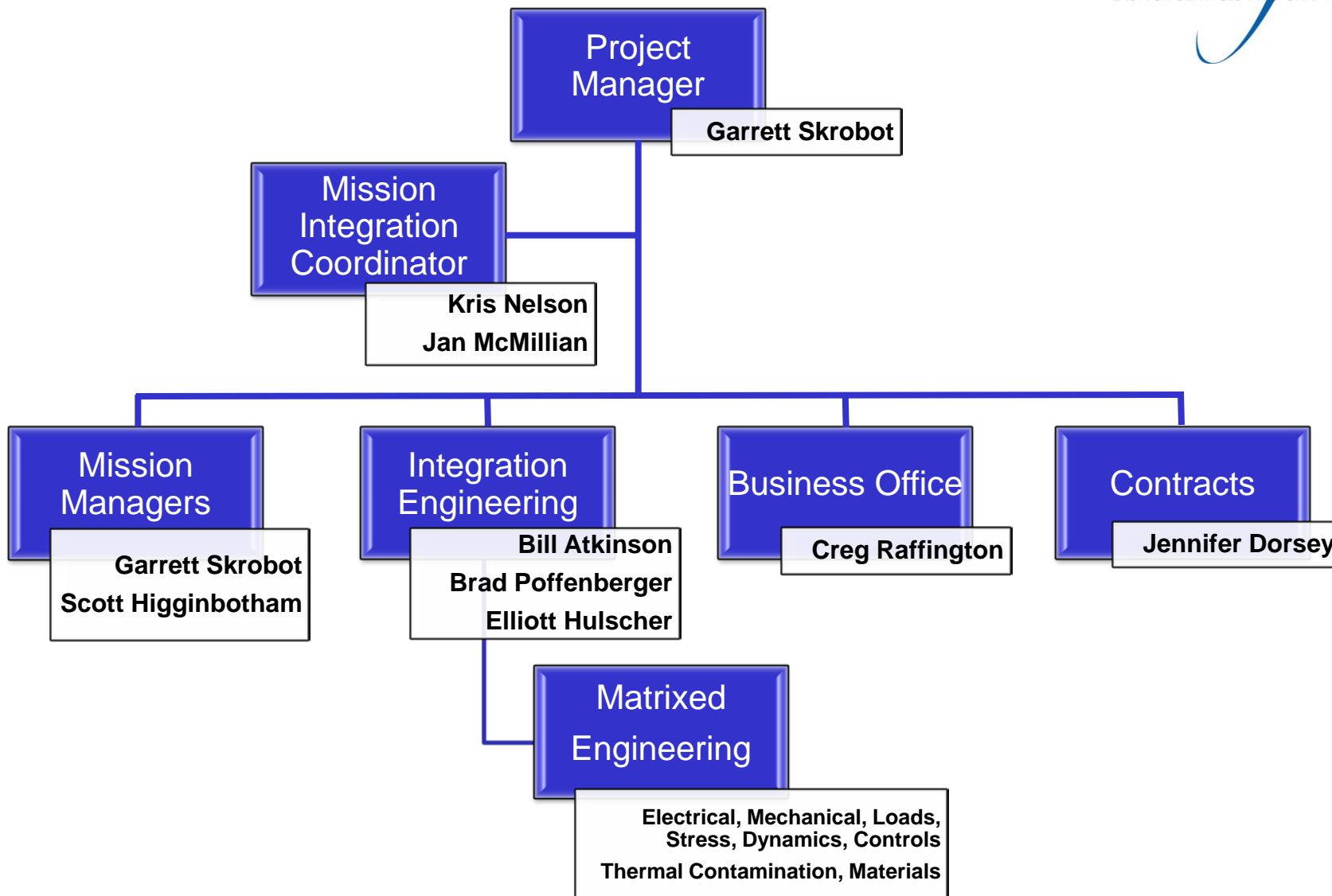
ELaNa Missions Manifest 2009

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 1 PPOD 3 CubeSats	ELaNa III Oct 28, 2011 NPP – DII 3 PPOD 5 CubeSats	ELaNa V Nov 28, 2013 CRS#3 – F9 4 PPODs 5 CubeSats	ELaNa VIII April, 2014 CRS#4 – F9 2PPODs 2CubeSats / ELaNa IX Aug 2014 CRS#5 – F9 PPODs 2 CubeSats	ELaNa X Oct 2014 SMAP – DII 3 PPODs 3 CubeSats	ELaNa July 2016 ICESat II – DII 3 PPODs CubeSats	ELaNa Nov 2016 JPSS-1 – DII 3 PPODs CubeSats
NRO		ELaNa VI Sept 13, 2012 NROL-36– DII 3 PPOD 4 CubeSats		ELaNa II Nov 2013 NROL-39 – AV 2 PPODs 4 CubeSats	ELaNa XI Nov 2014 AFSPC-5 2 PPODs 4 CubeSats / ELaNa XII Dec 2014 NROL-55 – AV 2 PPODs 2 CubeSats		
ORS			ELaNa IV NET 9/30/13 ORS-3 4 PPODs 11CubeSats / ELaNa VII Oct 2013 ORS-4 1 PPODs 2 CubeSats				
Commercial					ELaNa July2015 PPODs CubeSats		

Manifested   **In Work**

2

Missions

ELaNa

# of CubeSat Missions	Primary Mission	Year Launched/Expected	# of P-PODs	# of CubeSats	Status
ELaNa I	Glory	2011	1	3	Failed
ELaNa III	NPP	2011	3	5	Launched
ELaNa VI	NROL-36	2012	3	4	Launched
ELaNa IV	ORS-3	2013	4	11	Manifested
ELaNa V	CRS#3	2013	4	5	Manifested
ELaNa VII	ORS-4	2013	1	2	Manifested
ELaNa II	NROL-39	2013	2	4	Manifested
ELaNa VIII	CRS#4	2014	2	2	Manifested
ELaNa IX	CRS#5	2014	2	2	Manifested
ELaNa X	SMAP	2014	3	3	Manifested
ELaNa XI	AFSPC 5	2014	2	4	In Work
ELaNa XII	NROL-55	2014	2	4	In Work
Totals			**28**	**49**	

NASA CubeSat Initiative
CubeSats Readiness Date

2013	2014	2015	2016
51° at 325km			
12	9	4	0
LEO Sun Sync			
17	3	3	0
LEO Non-Sun Sync			
23	17	11	0
GTO			
2	1	2	0
Interplanetary			
0	1	0	0
Totals			
54	31	20	0

Developments

- Developing a system to attach CubeSat carries to the aft end of the Falcon 9 Second Stage

- Preparing a SOW to study the addition of a 6U carrier on the Atlas V Aft Bulk Head Carrier

- Risk reduction of the CalPoly PPOD by studying alternatives to the separation microswitch and reducing EMC/EMI radiation output

- The NanoLaunch Carrier System with Tyvak with reduce the mass of the cubesat carrier system for use on future NanoLaunch Vehicles

- Working with Garvey Spacecraft Corporation for a series of flight to test new CubeSat technologies
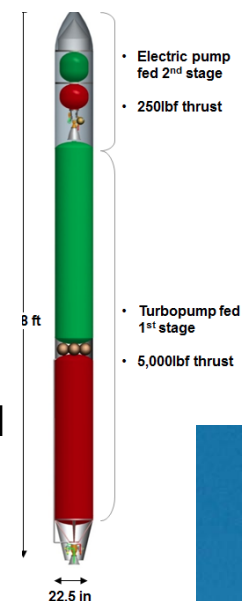
CubeSat NanoLaunch

- Launch Services Program released a Sources Sought for potential CubeSat-Class Payload launch services
  - Two Class of payloads
    - » 15-50kg
    - » 50-150kg
  - Minimum orbital altitude of 425km with a launch inclination from 0 to 98 degrees
  - Provides for dedicated STEM initiative with multiple contracted P-POD launches
  - Opportunity to engage less experienced workforce
  - Potential to stimulate new lower cost providers to NLS market
  - New Contract opportunity to showcase to current customer base
  - Enables pathfinder for a potential future P-POD-driven IDIQ contract vehicle for small or nano-launch vehicles (no first flight requirement, high risk tolerant contract)
  - Response were due on April 15

- Electric pump fed 2nd stage
- 250lbf thrust

- Turbopump fed 1st stage
- 5,000lbf thrust

8 ft

22.5 in

SBIR NanoLaunch Technologies

- Six contractors have been selected for award for Enhanced Phase I SBIRs in the NanoLauncher technology subtopic

    - Tyvak Nano-Satellite Systems LLC

        » *Flexible Low Cost Avionics for NanoSatellite Launch Vehicle Control and GPS Metric Tracking*

    - Millennium Engineering and Integration Company

        » *Automated Flight Safety Inference Engine (AFSIE) System*

    - Garvey Spacecraft Corporation

        » *Incremental Evolution of a 10/250 NLV into a 20/450 NMSLV*

    - Ventions, LLC

        » *Regeneratively-Cooled, Pump-Fed Propulsion Technology for Nano / Micro Satellite Launch Vehicles*

    - Tethers Unlimited, Inc.

        » *SWIFT-nanoLV Avionics Platform*

    - Invocon, Inc.

        » *Wireless Intra-vehicle Communication System (WICs)*

NASA EDGE Projects

In an effort to increase awareness of and participation in NASA's CubeSat Launch Initiative (CSLI), Launch Services Program (LSP), and ELaNa (Educational Launch of Nanosatellite), LSP has contracted NASA EDGE to develop and produce multiple NASA EDGE Vodcasts, promotional videos and social media efforts.

- Episode 1 "CubeSat"
  - A full 23 minute Vodcast focusing on the CSLI and NASA's LSP's role in supporting the program. Subject Matter Experts (SMEs) from CSLI, LSP and California Polytechnic State University (Cal Poly) were interviewed along with several current students and/or professionals from Cal Poly that are developing a CubeSat or have launched a CubeSat.

NASA EDGE Projects

- Episode 2 "Building CubeSats"
  - A full 23-minute Vodcast focusing on the process of developing, designing and preparing a CubeSat. By focusing on one or two specific teams, NASA EDGE will show the diversity of experiments, CubeSat configurations and give future participants a good idea of how they can participate.

- Episode 3 "Launching CubeSats" (Live)
  - A live webcast at a CubeSat Launch. The primary event will be the launch of the CubeSat/Primary rocket. While we countdown to launch, NASA EDGE will interview SMEs, CubeSat team members and take questions from their social media stream.

- Social Media Support & Promotional Videos
  - CSLI and LSP will be featured in the NASA EDGE Social Media Network throughout the year. NASA EDGE will also produce short video promotions for CSLI & LSP based on creative opportunity.

Additional Projects

- ELaNa Video of NPP Launch

  – Shows students working with CubeSats and the benefits for the future

- ELaNa Web Site

  – In December 2012, the ELaNa page was unveiled on the Small Satellite Missions portion of NASA.gov. The page will be updated on an ongoing basis; updates to include photographs, CubeSat information, launch details, etc.

- NanoSatellite Video

  – The June 15th launch of the Garvey Space high altitude Nanosatellite launcher will be recorded for a future NASA segment. The launcher will be carrying two CubeSats, the Cal Poly CP9 and the Merritt Island High School StangSat, The KSC RocketU payload will be integrated into the new NLVCD and a AMES payload.

Questions