Overview 1 Progress Report

Summary:

Team currently working with Nanoracks to launch Overview 1 in 2018.

Regulatory

Component	Status	Comments
FCC approval of STA license for X Band downlink	**Rejected 2nd Time**	CRS-14 launch blocked due to license rejection. Ryan working with Legal team

Cubesat: Integration WIP,

Component	Status	Comments
Pumpkin BM 2 Battery	**Complete**	Ready for flight
Pumpkin BM 2 Battery Pack F/W	**Complete**	Ready for flight

ClydeSpace EPS	**Complete**	Ready for flight
Sun Sensors- needed by ADCS to determine the right calculations	**Pending**	Need delivery of Camera module because Sun Sensors are mounted Camera module. (1 week)
Camera Module	**On Hold**	Subsystems are: PCB, Cameras, Camera Covers, heatsink Activities on hold until Live Planet Evaluation is complete by SpaceVR and Pumpkin New plan requires: 1. Evaluation of Live Planet Camera passing GEVS Standard Thermal/Vacuum testing at Pumpkin 2. Need to evaluate if Camera has a shutter. It needs a shutter otherwise Sensor risks burning if sensor is exposed directly to the sun when imaging. 3. Evaluation and Confirmation of STable Video and Image capture performance 4. Evaluation and confirmation with Pumpkin on Heat Management for Camera in the Cubesat without use of a Fan 5. If Steps 1-3 pass, need to do an initial Design with Pumpkin to confirm new dimensions of the Cubesat 6. Create initial working s/w integration between Live Planet and Cubesat Bus on the TK1 7. Complete full ConOps for Camera Module functions

Camera PCB	**On hold**	Oct 23: Working to plan out initial testing of LivePlanet camera in Pumpkin's Thermal/Vacuum lab to see if it's suitable for spaceflight. Sept 25: No change Sept 18: SpaceVR Working to manufacture new board with VREO or pegasus Sept 11: Working to resolve Test version of the board Flight version to be built after **Jerami will resend technical drawings of form and fit of the board.** Blaze will send order for manufacturing Aug 14-ETA for receipt Sept 6 Camera PCB: quickturnpcb.co.kr rejected submission due to not following design rules. Blaze to resubmit, ETA TBD
Pegasus USB 3.0 Interface Board for Sony FCB-MA130 camera module	**On hold**	Oct 30: No longer needed if design changes to Live Planet Oct 23: On hold because redesign of camera module is looking into Live Planet 360 Oct 16: RND USB cable one end into TK1 and other end into VREO PCB board (may not be needed in new design) Oct 2: Working to sort out with RND Sept 18: Awaiting integration with new Camera PCB when its ready Sept 11: we have the interfaces. Need to share with pumpkin the interface to show if it fits. Jerami hasn't seen this before. Mark will send over PM-CIBU-130 (Fozia will send info) Order 8 of these parts http://www.pegasusmicro.com/products/camera-interfaces/pm-cibu-130 Need call with Pegasus to close order Flex comes from Camera PCB Aug 28: ETA for arrival Aug 29

8 Camera Integration	**On Hold**	Oct 30: no longer needed if design changes to LivePlanet Sept 25: SpaceVR to confirm location of flight cameras Need completion of Camera PCB and USB interface for this to complete.
Camera Mounts	**On Hold**	Oct 30: Need redesigned mounts for Live Planet Sept 25: No change Sept 18: SpaceVR (Ryan) took mounts from Pumpkin on Sept 14. Sept 11. Mounts received need to integration. SpaceVR to build Camera module before delivery. Cody will do camera module integration Need 2 mounts with 4 cameras each (need update from @Blaze on their status) Blaze to submit order to Proto Labs with Wire Money transfer Aug 21
Camera Cover	**On Hold**	Oct 30: Need redesigned mounts for LivePlanet Sept 18: SpaceVR has Sept 11: have cover awaiting integration Aug 7 submitted. Aug 21: Cover Complete- needs to be delivered to Pumpkin. Sony Cameras need to all be in place on the camera mounts
Camera Heat Sink	**On Hold**	Oct 30: Currently Live planet uses a fan for cooling, need a fanless redesign for cubesat and confirmation of effective Heat dissipation Sept 18: SpaceVR has Sept 11: have cover awaiting integration Aug 8 will be submitted. ETA @Blaze to provide latest status

Plate Camera Heat Sink and Camera mounts	**Complete**	Sept18: Complete (Jerami confirmed upon visual inspection Will happen after Heat Sink is received. (SpaceVR to do) Blaze to determine Plating vendor. Update needed from @Blaze
Solar Panels	**Complete**	Ready for flight

Solar Panel - Attach	**WIP**	See above: Jerami to confirm when this will happen. Andrew to do test on Dov's bus on it Aug 22/23 and then will let Jerami know when Solar panels can be attached.
Solar Panel - Test Deploy Panels	**WIP**	Sept 25: No change Sept 11: will happen after overview 1 is integrated. Will need to coordinate with Aaron on fully integrated O1 After PRM is complete and Panels are attached.
ADACS/ADCS	**Complete**	Updated flight s/w to accept commands and return telemetry. Current version of flight s/w supports that.
ADACS S/W testing	**Completed**	Ongoing activity - Pumpkin Testing of flight s/w will start first week of August (ETA to be confirmed and owner of testing) Confirmed that ADACS commands and telemetry are transmitting successfully on the bus Aug 7: dov adding new functionality for PRM by Aug 11 Aug 21: Should be complete-will get update from Dov on Aug 28 Aug 28: Completed

Cables **RND USB 3.0 - Tx data from camera to mCOM10 payload computer**	**On Hold**	Oct 30 Not needed for Live planet design-need to confirm new USB cable needs Oct 16: May not be needed in new design-was designed for VREO PCB Oct 2: sorting out questions RND has on the connector key Sept 25: Order in progress Sept 18: Connector confirmed to fit. SpaceVR to order new cable Sept 11: Will test fitting on Wednesday (Ryan) Will receive RND USB 3.0 - Shorten Aug 7, Test @ pumpkin Aug 28: investigate use of connector option suggested by RND. Jerami thinks it should without shortening. Aug 8, order Aug 9 ETA for Receipt Aug 16, Pumpkin Integration: Aug 21 Aug 21: Blaze sent revised specs for cable, ETA for delivery pending from RND.
Cable: RND GPIO - Turns Cameras on and off	**On Hold**	Oct 30 Not needed for Live planet design-need to confirm new GPIO cable needs Oct 16: Needed for VREO PCB only Sept 18: At Pumpkin, no change At Pumpkin, Connector on. Integration into O1 pending. Sept 8 - we have an extra cable in house likely (confirming with Jerami)
Cable RND Ethernet Cable - Connectivity between flight and payload computer	**WIP**	Oct 30 May need to reevaluate cable needs for Live Planet Sept 18: At Pumpkin no change Sept 11:No revised pinout needed. Aug 28: New pinout not needed At Pumpkin, Connector on. Integration into O1 pending

		Blaze needs to provide revised Pin Out
Cable: RND PWR Power Cable- Gives payload computer 12V power	**WIP**	Oct 30: LivePlanet has different power interfaces Sept 18: At Pumpkin no change At Pumpkin, Connector on. Integration into O1 pending
Cable: Omnetics - Data and power -Provides partial power to X-Band Radio and connects to the BBB flight comput	**WIP**	Sept 11: Coming with Flight Radio Paid for and received. Has been plugged into Tethers Flight Radio. Will be delivered to Pumpkin with delivery of Flight Radio. Pending final integration with Overview 1 Cubesat structure
Cable: Tethers X-Band High Power Cable	**WIP**	Paid for and being shipped by Tethers- ETA Aug 8, Will be delivered to Pumpkin with delivery of Flight Radio. Pending final integration into Cubesat structure at Pumpkin
X-Band Antenna and Cable	**WIP**	Received @Pumpkin July 21. Jerami will look at it after July 31. Confirmed by Jerami that they are good. Awaiting integration near the end due to being sensitive
S-Band Antenna and Cable	**WIP**	Sept 18: Pumpkin has antenna awaiting integration Pumpkin has Antenna, awaiting integration-due to it being sensitive
L1 Antenna (STX3) and Cable	**WIP**	Sept 18: No change in status Sept 11: When we get the flight stack we can plug in STX3 and then start testing In Stock - Pumpkin has Antenna, awaiting integration-due to it being sensitive

GPS Patch Antenna/Cable	**WIP**	Sept 18: No change in status Sept 11: Awaiting integration- awaiting Camera module Ordered - ETA Aug 11 Aug 21: Pumpkin received GPS antenna, needs to be attached to Camera module
BBB H/W	**WIP**	BBB needs replacement with Flight Module BBB; MBM 2 Rev D ready.
BBB S/W	**WIP**	Sept 18: WIP ongoing until s/w complete by Pumpkin Sept 11: WIP S/w is feature complete. Rigorous once over pending (Dov)
Tethers SWIFT X/S Flight Radio	**On Hold**	Oct 16: Received Radio, need to develop next steps for s/w testing, currently blocked by unavailable resources and awaiting shipment of Cables for Loopback testing Sept 18: No change in status Sept 11: working through issues Flight radio currently experiencing technical issues. Need fixes from Tether. F/W fixed. Will know if it's functional tonight. Aug 21: Radio returned to Tethers, awaiting repaired version by Aug 25 Aug 28: Awaiting repaired version by Sept 1

Tethers SWIFT Thermal Plate	**Complete**	Sept 18: Thermal plate complete, awaiting to be used by the Flight Radio Pumpkin to provide ETA once Adam is back from SmallSat Aug 21: Need Adam to schedule assembly date Aug 28: Adam to schedule assembly date
Tethers Flight Radio S/W	**On hold**	Oct 23: Development currently on hold due to resource constraints. Sept 18: Early implemention of Solar Panel PRM, and ADACS is done. Work has started, Aaron, Blaze working weekly sprints Aug 21: Aaron can decode Telemetry summary packet, worked on Flight radio logic last week. Aug 22: Test Architecture done, Seq 0 from ConOPs done, Built Test system for flight. Currently sequence diagram doesn't have negative scenarios only positive. Need to consider cases like - what if solar panels don't open and other negative scenarios. Start with burn wires sequence, Building an abstraction point where various h/w elements can built (eg turn on power on TK1) 66% of State Definition done
Payload S/W to control Solar Panels, Cameras, Battery	**On Hold**	Oct 23: Development currently on hold due to resource constraints. Aug 11:Work has started, Aaron, Blaze working weekly sprints Fozia Will setup s/w focused call for Fridays 8AM PST
Flight S/W to control ADCS	**On Hold**	Oct 23: Development currently on hold due to resource constraints. Aug 11:Work has started, Aaron, Blaze working weekly sprints

Pelican Case	**Need to acquire a new one**	The one SpaceVR provided does not secure Overview 1 properly and need to get a new one. (After HTC money)
Development Stack- Return	**WIP**	SpaceVR to Return to Pumpkin by Aug 25
Flight Stack deliver to SpaceVR	**WIP**	ETA TBD
ADACS Maryland Aerospace		Chuck Weyland contact

Overview 1 Software Development

Component	Status	Comment
Architect Python Test Coverage	**Complete**	Completed Aug 8
Implementation of ConOps State Definition	**Complete - Positive tests only** **Negative tests Pending**	Sept 8 Complete Aug 29: First pass complete, Blaze to review ConOps. Tested with i-four line coverage - mainly positive tests, negative testing need to happen
Basic Communication between Flight Computer and Payload Computer (BBB+TK1)	**Complete**	**Sept 8: Complete** **Aug 29: Working on the integration of the Flight and Payload computer (TK1)**
Basic Communication between Flight Computer and Payload Computer (mCOM10)	**Not Started**	**Will be tested on Flight stack when it is received from Pumpkin (ETA TBD)**
C2 Integration		**Oct 30: Blocked by Resource constraints**
View Telemetry using COSMOS- Via Globalstar	**Not Started**	**Resource Constraint**

View Telemetry using COSMOS- Via X-Band	**Not Started**	Via X-Band (transit / backup telemetry from flight computer to payload computer Partition / define file structure of SSD on payload computer
Command Package Generation and Communication between C2 COSMOS and Overview 1-Send Commands Via S-Band	**Not Started**	
Command Package Generation and Communication between C2 COSMOS and Overview 1- Receive Command execution status - X-Band or Globalstar	**Not Started**	
Flight Computer	**Blocked until ability to receive h/w or simulator response (ADCS)**	**Oct 30: Blocked by Resource constraints** **Aug 29: Test bus has ADCS Simulator, Aaron to discuss with Dov**
ADCS- Define attitude modes and integrate with Pumpkin SuperNova SDK: Power and Solar Panel Charging	**Not Started**	
ADCS- Define attitude modes and integrate with Pumpkin SuperNova SDK: Ground Station Attitude (X&S band pointing to the Ground)	**Not Started**	
ADCS- Define attitude modes and integrate with Pumpkin SuperNova SDK: Camera Orientation	**Not Started**	

ADCS- Define attitude modes and integrate with Pumpkin SuperNova SDK: GlobalStar Orientation	**Not Started**	
Battery Control Regulation - Integration with Supernova SDK via Predictive Method	**Not Started**	Oct 16: Getting value of Battery state of charge can be easily achieved by using a Supernova App or using a telemetry BM2 (State of Charge) value. ******* If recording to start in 45 mins and if Battery is less than 50% then switch to Solar Panels Ensure all C2 Requests are first checked to be doable with current Battery Power
Temp Control regulation integrate with Pumpkin SuperNova SDK	**Not Started-Not Blocked**	Needs to be engaged when Radio C2 Requests are made Check and report to Ground Station C2 every 45 Mins via L-Band
Solar Panel Control Engaged 30 mins after deployment to fully deploy after launch Use Cameras and battery level going up to check that they are fully deployed	**WIP - 50% Complete**	**Aug 29: Implemented to start solar panel deployment after 1800 seconds - Complete on Development bus**
Define ConOps state transition logic between L-Band, S-Band, and X-Band *S-Band Uplink Radio Control *L-Band Downlink Radio Control *Protocol for doing a full SUPERNOVA update and patches	**Not Started**	

Payload Computer	**Camera work blocked until Camera module ready-**	
Setup Engineering model of Flight Radio for Dev Testing	**Not Started**	
Camera Control-UVCStill parallelization timing after new camera PCB functional	**Not Started**	
Camera Control-Turn Camera On - Without C2 Turn on 8 Cameras Turn on 4 Cameras	**Not Started**	
Camera Control- Turn Camera On - With C2 Turn on 8 Cameras Turn on 4 Cameras	**Not Started**	
Camera Control-Turn Off Camera - Without C2	**Not Started**	
Camera Control-Turn Off Camera - With C2	**Not Started**	
Camera Control-Start and Stop Recording -Turn on - Without C2 8 Camera Recording Turn on 8 Camera recording Turn off 4 Camera Recording Turn on 4 Camera Recording Turn off	**Not Started**	
Camera Control-Start and Stop Recording -Turn on - With C2 8 Camera Recording Turn on 8 Camera recording Turn off	**Not Started**	

4 Camera Recording Turn on 4 Camera Recording Turn off		
Camera Control - Log all image metadata and save within image file	**Not Started**	
Camera Control - X-Band Downlink Radio Control of Captured Image Data to Ground Stations	**Not Started**	

Ground Station Readiness - WIP, Awaiting confirmation of first Atlas Ground station being ready, FCC status for S-Band

Component	**Status**	**Comment**
FCC Approval to use S-Band	**WIP**	Atlas working on it-ETA to close November 2017
3 Ground Stations go for Mission	**WIP**	Atlas will confirm which ground stations will support Overview 1 when Overview 1 Assembly and initial s/w integratin is complete. Atlas has a large network of Ground Stations to draw rom
Command and Control Software	**WIP**	COSMOS downloaded, now need to configure. Partial progress blocked by having a working qFEP additional o understand qFEP API (SpaceVR)
Atlas Amazon EC2	**Not Started**	Lower priority to other tasks right now
Atlas script to push data from Atlas EC2 to SpaceVR EC2	**Not Started**	Lower priority to other tasks right now
SpaceVR Amazon EC2	**Not Started**	Lower priority to other tasks right now
GlobalStar integration with Quantum FEP	**Not started**	L-Band to their GO to their control centre. Then globalstar send the information via CCSDS packets to FEP -> then to Cosmos. Questions: Can you tell globalstar where to send the packets?

Nanoracks - Officially now targeting a mission after CRS-14

Task	Status	Comments
Vibration/Thermal/Vacuum Testing	**Not Started**	Shortlisted DNB engineering as the lab to test at. Pending completion of Cubesat h/w Integration Date to execute to be finalized once h/w integration is complete NTS called July 17 and want to see if they can beat the DNB offer of $3800 Working with Nanoracks to get quote for Quanta Labs as well. Aug 22: Quanta $250/hour and this test is expected to be 3-4 for Vibration test. Need to get quote on Thermal,Fozia to send previous requests for quotes:
Nanoracks Safety data mix is missing a few fields of information from Near Space Launch	**Complete**	
Need to keep O1 under 5kg	**Pending**	

Video Content Tasks - Not Started

Task	Status	Comments
Setup Amazon EC2 for SpaceVR	**Not Started**	Lower priority in comparison to other tasks
Complete Stitching Scripts	**Not Started**	Lower priority in comparison to other tasks

Testing

Following areas need to be tested to ensure Mission success

Task	Status	Comments

Mission Control C2 Tests ● **Trigger Camera image capture** ● **Solar Panel Commands** ● **ADCS commands** ● **Battery Commands**	**Not Started**	Blocked by Cubesat, Ground Station and C2 integration
End to End RF test S, X, L Band	**Not Started**	Blocked by pending delivery of Flight Radio and assembly of O1
View Telemetry Data	**Not Started**	Blocked-pending setup of Globalstar account, integration with Atlas FEP and COSMOS setup
Transmit Camera data for 10 mins	**Not Started**	Blocked by Cubesat, Ground Station and C2 integration
Test S-Band Uplink Command via C2	**Not Started**	Blocked by Cubesat, Ground Station and C2 integration
100 min Data test	**Not Started**	Blocked by Cubesat, Ground Station and C2 integration
View VR Video from 10 and 100 min Captures	**Not Started**	Blocked by Cubesat, Ground Station and C2 integration and VR Content infrastructure setup