As you enter…

Please note we will be recording this session to post on our website for those unable to attend

In the chat, please enter:

- **Name**
- **School**
- **Planned Competition Division (Gateway/Moon/Mars)**

Proposal Webinar

Mark Abotossaway, Blue Origin Engineer, FNL Assistant
Brittany Nez, GE Aerospace Engineer, FNL Assistant
Rob Cannon, FNL Program Manager

ARTEMIS
STUDENT CHALLENGES
nasa.gov/stem/artemis.html

NASA Partner

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Meet the FNL Team

Wisconsin Space Grant Consortium

• Kevin Crosby, Director	kcrosby@carthage.edu
• Christine Bolz, Assistant Director	cbolz@carthage.edu
• Rob Cannon, FNL Project Manager	rcannon@carthage.edu
• Connie Engberg, Project Support Assistant	cengberg@carthage.edu
• Megan Goller, Accounts Assistant	mgoller@carthage.edu

First Nations Launch Technical Team

• Frank Nobile, Technical Coordinator, Wisconsin Tripoli	maxq3@aol.com
• Mark Abotossaway, Project Assistant, Blue Origin (Alumni)	mark.a.abotossaway@gmail.com
• Brittany Nez, Project Assistant, GE Aerospace (Alumni)	brittanyanez4@gmail.com

Tripoli Rocket Association

• Bob Justus, Tripoli Assistant, Illinois Tripoli	bob@mhbofni.com

Overview

- Proposal Milestone
- Proposal Submissions
- Report Overview
- RockSim Overview
- Flysheet Overview

Resources

- Follow along with us:
  - Templates: https://spacegrant.carthage.edu/first-nations-launch/rubric/
  - Example Proposal Template: https://spacegrant.carthage.edu/live/files/5474-usli-osu-2019-proposalpdf
- Handbooks:
  - Moon Handbook: https://spacegrant.carthage.edu/live/files/6495-fnl25handbookmoonpdf
  - Mars Handbook: https://spacegrant.carthage.edu/live/files/6496-fnl25handbookmarspdf
  - Advisor Handbook should be available later today
  - Gateway Handbook still in work

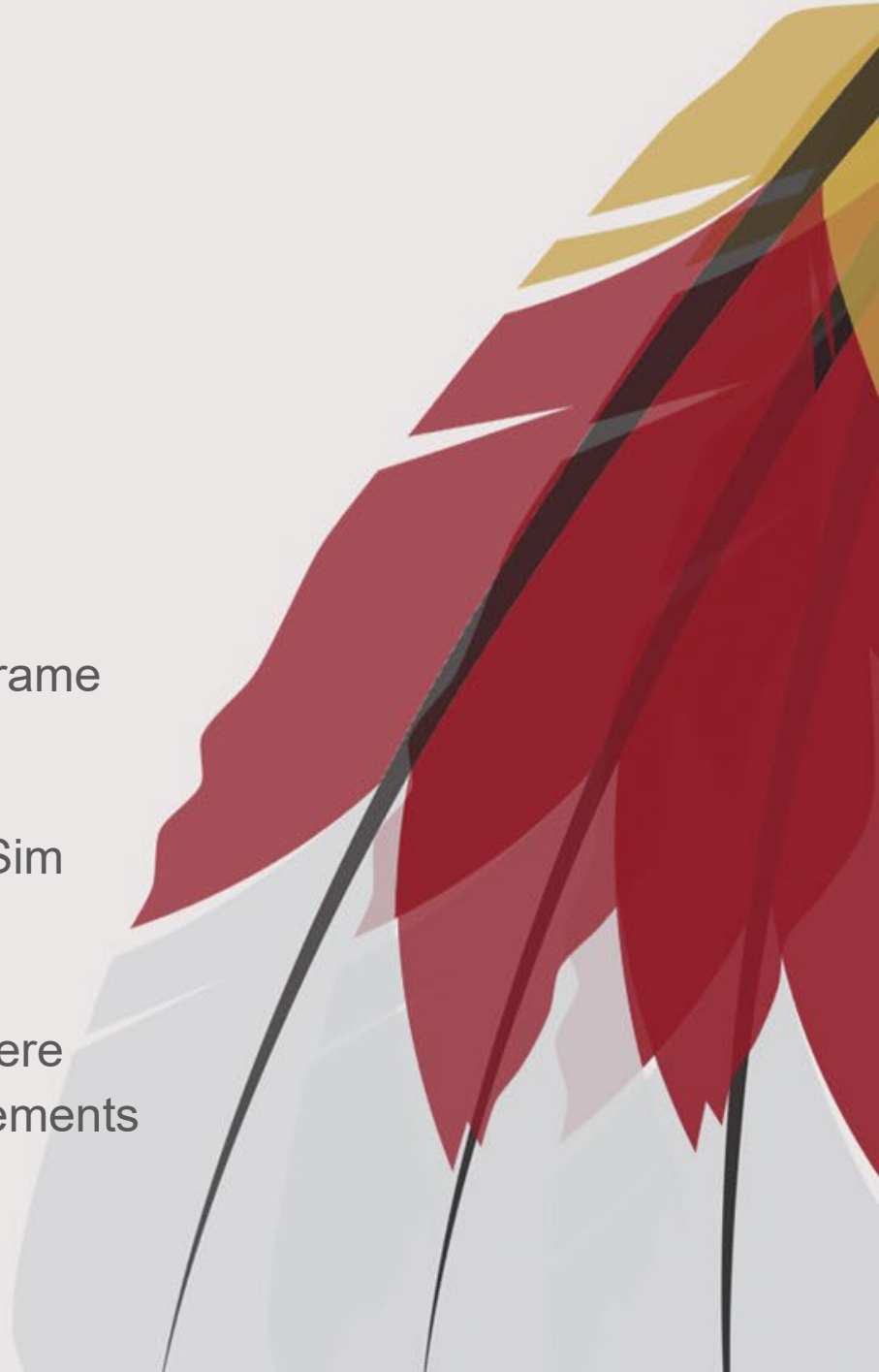
Proposal Milestone

- Proposal Milestone is the initial Milestone
  - PDR -> CDR -> FRR -> PLAR to follow

- Proposal phase is when the team is still forming
  - Provide information that shows the team will be successful
    - Show us you have prepared for the entire project
  - Technical details (components) should not be provided at Proposal phase
    - Do not simply make arbitrary component choices based on previous year
  - Concepts and trade studies are more important
    - Show us you have looked at various options, beyond previous year

Proposal Submissions

- Report
  - Please follow and fill the 2025 Proposal Template
- RockSim
  - A basic RockSim file should be submitted with general airframe selection
    - RockSim does not need all internals at this phase
  - We want to know you have / understand how to use RockSim
- Flysheet
  - Basic flight (simulation) performance should be provided here
  - We want to know you understand performance and requirements



Proposal Report Overview

- General Info
  - We want you to provide the general team information every Report
  - List a Faculty Advisor and Rocketry Mentor (NAR / TRA L2 or higher)
- Facilities / Equipment
  - We want you to provide details of your school facilities and equipment
    - Requires foresight to understand what is all needed to design, test and build
- Safety
  - We want you to provide (think about) all safety aspects
    - Various safety requirements – school, state, federal

Proposal Report Overview

- Technical
  - Vehicle
    - Provide initial vehicle details, and show trade studies have been completed
  - Recovery
    - Provide initial recovery components, and show trade studies have been completed
  - Motor
    - Provide initial motor choice, and show trade studies have been completed
  - Simulations
    - Show that simulations have been completed (shows vehicles / motors)
  - Challenge
    - Provide initial concepts to address the respective Challenge (and trades)

Proposal Report Overview

- Project Plan
  - Test Plans*
    - Provide initial Test Plan outline (What do you need / want to test? When?)
    - Ensure you test 1) Rocket Components 2) Challenge Components
    - This Test Plan will be updated at each Milestone
      - Suggest you create and maintain a separate spreadsheet to track Testing
      - You can screenshot or copy this master test sheet into the Reports
  - Requirements*
    - Provide initial Requirements Verification list
      - Extract / List all the Requirements from the Competition Handbooks
    - Ignoring / missing requirements are usually detrimental to success
    - This Requirements Verification will be updated at each Milestone
      - Suggest you create and maintain a separate spreadsheet to track Requirements

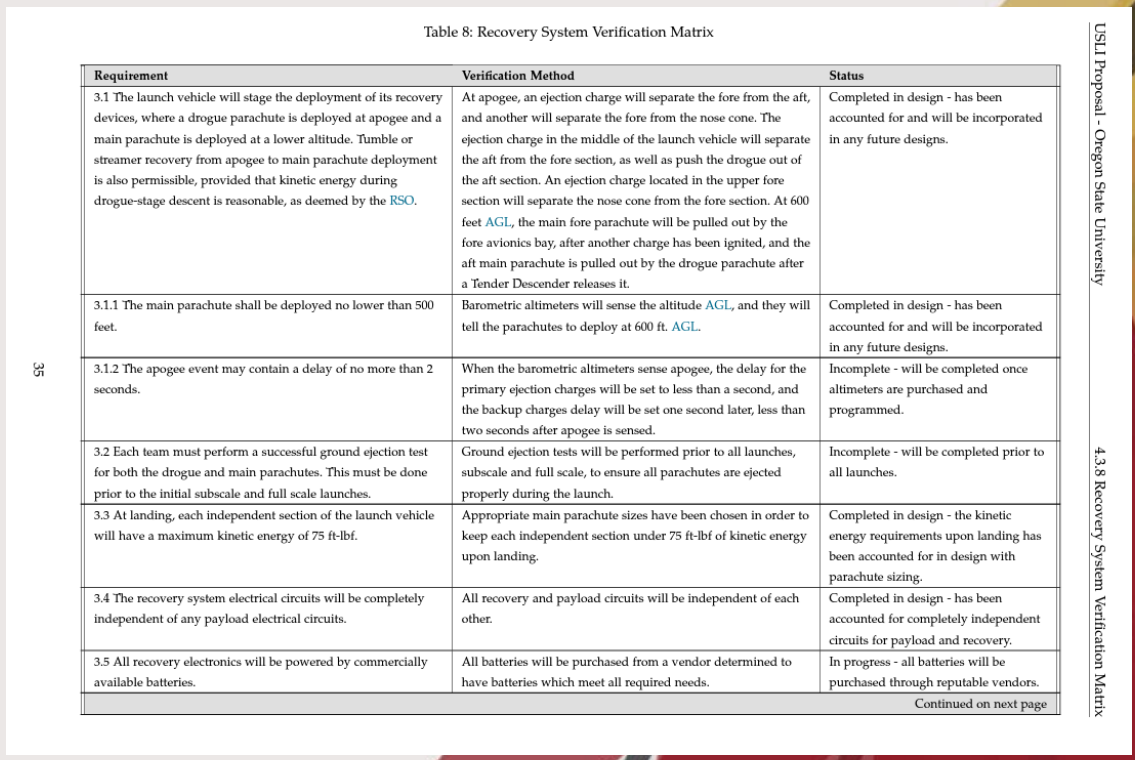


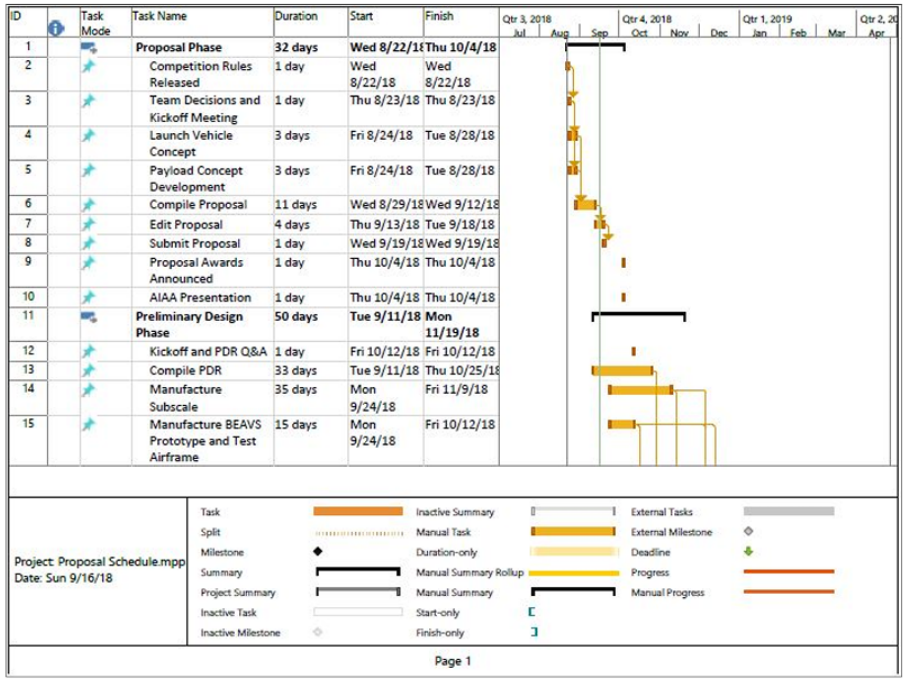
Table 8: Recovery System Verification Matrix

Requirement	Verification Method	Status
3.1 The launch vehicle will stage the deployment of its recovery devices, where a drogue parachute is deployed at apogee and a main parachute is deployed at a lower altitude. Tumble or streamer recovery from apogee to main parachute deployment is also permissible, provided that kinetic energy during drogue-stage descent is reasonable, as deemed by the RSO.	At apogee, an ejection charge will separate the fore from the aft, and another will separate the fore from the nose cone. The ejection charge in the middle of the launch vehicle will separate the aft from the fore section, as well as push the drogue out of the aft section. An ejection charge located in the upper fore section will separate the nose cone from the fore section. At 600 feet AGL, the main fore parachute will be pulled out by the fore avionics bay, after another charge has been ignited, and the aft main parachute is pulled out by the drogue parachute after a Tender Descender releases it.	Completed in design - has been accounted for and will be incorporated in any future designs.
3.1.1 The main parachute shall be deployed no lower than 500 feet.	Barometric altimeters will sense the altitude AGL, and they will tell the parachutes to deploy at 600 ft. AGL.	Completed in design - has been accounted for and will be incorporated in any future designs.
3.1.2 The apogee event may contain a delay of no more than 2 seconds.	When the barometric altimeters sense apogee, the delay for the primary ejection charges will be set to less than a second, and the backup charges delay will be set one second later, less than two seconds after apogee is sensed.	Incomplete - will be completed once altimeters are purchased and programmed.
3.2 Each team must perform a successful ground ejection test for both the drogue and main parachutes. This must be done prior to the initial subscale and full scale launches.	Ground ejection tests will be performed prior to all launches, subscale and full scale, to ensure all parachutes are ejected properly during the launch.	Incomplete - will be completed prior to all launches.
3.3 At landing, each independent section of the launch vehicle will have a maximum kinetic energy of 75 ft-lbf.	Appropriate main parachute sizes have been chosen in order to keep each independent section under 75 ft-lbf of kinetic energy upon landing.	Completed in design - the kinetic energy requirements upon landing has been accounted for in design with parachute sizing.
3.4 The recovery system electrical circuits will be completely independent of any payload electrical circuits.	All recovery and payload circuits will be independent of each other.	Completed in design - has been accounted for completely independent circuits for payload and recovery.
3.5 All recovery electronics will be powered by commercially available batteries.	All batteries will be purchased from a vendor determined to have batteries which meet all required needs.	In progress - all batteries will be purchased through reputable vendors.

Continued on next page

Proposal Report Overview

- Project Plan
  - Schedule
    - Provide an initial Schedule Outline (prefer Gantt Chart format)
    - Include aspects such as Testing, Procurement, Building, Fabrication etc.
    - The Schedule will be updated at each Milestone
      - Suggest you create and maintain a separate Gantt chart spreadsheet
  - Budget
    - Provide an initial Budget Outline
    - Include all funding sources, and breakdown your budget allocations by group
    - The Budget will be updated at each Milestone
      - Suggest you create and maintain a separate spreadsheet
  - Sustainability
    - Discuss how you plan to grow the team for long term sustainability



ID	Task Mode	Task Name	Duration	Start	Finish
1		**Proposal Phase**	**32 days**	**Wed 8/22/18**	**Thu 10/4/18**
2		Competition Rules Released	1 day	Wed 8/22/18	Wed 8/22/18
3		Team Decisions and Kickoff Meeting	1 day	Thu 8/23/18	Thu 8/23/18
4		Launch Vehicle Concept	3 days	Fri 8/24/18	Tue 8/28/18
5		Payload Concept Development	3 days	Fri 8/24/18	Tue 8/28/18
6		Compile Proposal	11 days	Wed 8/29/18	Wed 9/12/18
7		Edit Proposal	4 days	Thu 9/13/18	Tue 9/18/18
8		Submit Proposal	1 day	Wed 9/19/18	Wed 9/19/18
9		Proposal Awards Announced	1 day	Thu 10/4/18	Thu 10/4/18
10		AIAA Presentation	1 day	Thu 10/4/18	Thu 10/4/18
11		**Preliminary Design Phase**	**50 days**	**Tue 9/11/18**	**Mon 11/19/18**
12		Kickoff and PDR Q&A	1 day	Fri 10/12/18	Fri 10/12/18
13		Compile PDR	33 days	Tue 9/11/18	Thu 10/25/18
14		Manufacture Subscale	35 days	Mon 9/24/18	Fri 11/9/18
15		Manufacture BEAVS Prototype and Test Airframe	15 days	Mon 9/24/18	Fri 10/12/18

Figure 17: OSRT's Schedule for 2018-2019 USLI (1/3)

Proposal Report Tips

- Use figures / images in place of text wherever possible
  - CAD images, or RockSim images then reference the image
  - Component images once components are selected
- Units – determine a consistent set of units for the Report
  - Try not to mix units (feet, inches, meters etc.)
- Use tables where applicable (budgets, schedules)
  - If tables are large, possibly add them as an Appendix instead of inline

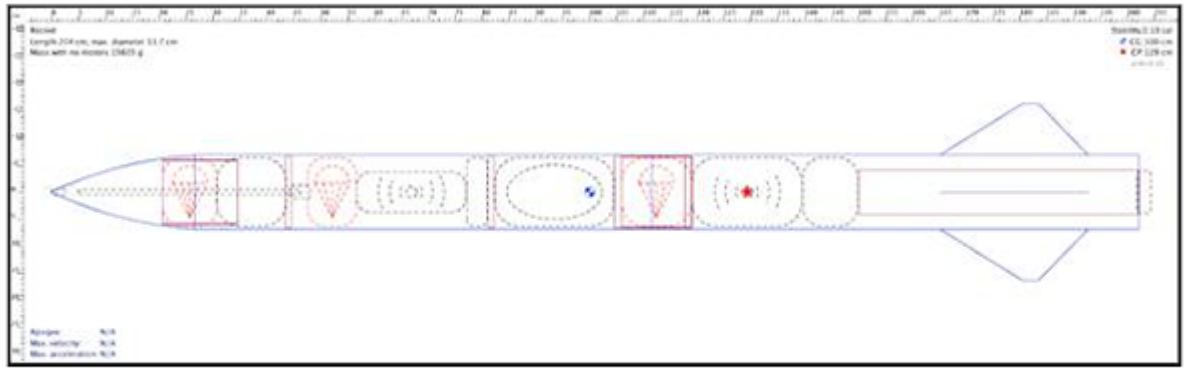


Figure 7: Launch Vehicle Equipment Layout

Proposal RockSim Overview

- Simulations
  - Please obtain and use RockSim software (trials or licensed)
  - RockSim is the REQUIRED program
    - You will receive zero points for all simulation aspects if you do not submit RockSim
  - At a minimum, you will need to have the airframe selected
    - It is important you understand the effects of drag and weight on simulations
    - You may want to complete trade studies on various airframes / motors
    - Internal details (avionics mass, parachute selections) are not important currently
  - At Proposal, we mainly want to see you have / understand RockSim
- You will get feedback (with comments) about your simulations – please expect, review and incorporate this feedback

Proposal Flysheet Overview

- Vehicle Parameters
  - Fill out the Flysheet with the required information
    - Ensure you use the correct Flysheet (use the 2025 Flysheets)
  - Each Milestone, the amount of required flysheet data will increase
    - Proposal phase does not require the entire sheet to be filled out
  - Several Flysheet parameters expect a range or specific value
    - Ensure you review and understand the competition Requirements
- You will get feedback (with comments) on your Flysheet – please expect, review and incorporate any comments

RockSim

- https://www.apogeerockets.com/index.php?main_page=product_software_info&products_id=3300
  - Trial License (30 days): https://www.apogeerockets.com/Rocksim/Rocksim_Trial
  - Rocketry Challenge Licenses ($15 ea, after receipt of award letter): https://www.apogeerockets.com/Rocket_Software/RockSim_Educational_TARC
- Additional Resources:
  - Video Series: https://spacegrant.carthage.edu/first-nations-launch/rocket-instructional-videoswebinars/
  - Tools and Tips: https://spacegrant.carthage.edu/first-nations-launch/tools-and-tips/
    - FNL Resources
    - Webinars & Presentations

Any Questions?