**Customer Needs**

**Customer Statements**

The customer is the NASA Artemis Student Launch Challenge, which requires a launch vehicle following a specific set of parameters as outlined by NASA. The needs were identified by discussions with Dr. McConomy and by consulting the NASA Student Launch Handbook. Needs will be further developed during a panel discussion with NASA personnel pending competition acceptance.

**Interpreted Needs**

Table 1 displays the question to the customer in the first column, the customer's response in the second column, and the inferred need in the third column. This list combines questions asked to Dr. McConomy and questions answered from the NASA Student Handbook.

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| **Question/Prompt** | **Customer Statement** | **Interpreted Need** |
| What is the maximum tolerable G-force that stem-Nauts can experience in flight? | 6 G’s is the maximum sustained G-force that STEMnauts can experience, and 50 G’s is the maximum impact G’s that the STEMnauts can experience. | The rocket produces no more than 6 G’s of force during flight and 50 G’s of force during impact. |
| What is powering the vehicle? | The vehicle needs a commercial high-power rocketry motor that is certified by the Association of Rocketry (NAR) or the Tripoli Rocketry Association (TRA). | The rocket uses motors that are certified by the NAR/TRA. |
| What do you like the most about the previous vehicle? | The previous vehicle’s material selection was well thought out as well as efficient fabrication procurement. | The material selection for this year’s vehicle uses the previous design as a foundation with emphasis on improving weak points. |
| Do the full-scale vehicle or subscale have a required size? | There are no official size requirements for the full-scale vehicle, however the subscale vehicle will be no larger than 75% of the full-scale vehicle. | Sub-scale vehicles will be less than 75% the size of the full-scale. |
| What is the mission of this vehicle? | The mission of the rocket is to reach an apogee of 4000-6000ft, have a controlled fall back to the ground using parachutes, and land with a kinetic force safe for the STEMnaut passengers. | The vehicle reaches roughly 5,000ft during flight and lands at a speed safe for human passengers. |
| What changes do you want to make to this year’s rocket? | More extensive testing of parachutes to be more reliable when deploying as well as complying with last years’ TRA issues. | Ensure the rocket satisfies the requirements of the TRA safety personnel better than last year. (ex. Having a detachable nosecone)  Also, further testing of rocket subsystems to ensure optimal execution during flight. |
| Are there any outreach opportunities the club will be responsible for in terms of growing interest and involvement? | The Office of STEM Engagement seeks proposals from colleges to conduct the NASA University Student Launch Initiative to inspire the next generation of space explorers. | The team may visit local schools and teach technical skills to students to provoke interest in space exploration. |
| What flight data needs to be recorded? | The data that the vehicle needs to acquire includes velocity, acceleration, barometric pressure (altitude) plus other parameters that are relevant to the ones stated above. | The vehicle can safely and accurately acquire and relay altitude, velocity, acceleration, and pressure data in real time. |
| What safety protocols need to be met and where are these protocols located? | The NASA Student Handbook outlines all the safety protocols to be followed. | The team Range Safety Officer meets or exceeds official safety guidelines, including debriefings, shop safety presentations, etc. |
| What documentation does NASA require to ensure compliance with the competition and federal regulations? | The NASA Student Handbook outlines papers the team writes and submits at various deadlines. | The team completes a Proposal, PDR, CDR, FRR, and PLAR for the rocket design and flights. |

**Overview**

A detailedreading of the 2025 Student Launch Handbook and a meeting with our sponsor Dr. McConomy were used to gather the customers' statements, or needs. The questions asked, responses and our interpretations are listed in Table 1. A summary of the customer needs is that a rocket can be launched, reach a certain apogee, relay flight data in real time, and have a safe recovery. Dr. McConomy highlighted several areas for improvement based on previous efforts. He emphasized the importance of adopting a systems engineering approach that prioritizes payload requirements and integration and working to build up the club side of the project, the “Zenith Program”. Additionally, NASA as a customer has a need for robust data collection, clear project deliverables, thorough documentation, and local stem engagement. Upon competition acceptance, the team will participate in a Q&A with NASA representatives to further discuss our design and ensure competition compliance.