## 1.2 Customer Needs

The sponsor and customer for this project is Boeing. Questions were generated based on research into current glider models and through meetings with Dr. Kourosh Shoele, the team's advisor. The customer needs were determined through a Microsoft Word document sent to Shawn Butler, the Boeing liaison. Questions were posed and answered via this document. Table 1 shows the question asked, the directly quoted response from Shawn, and the interpreted need based on this response.

Table 1: Customer Interview Questions, Responses, and Interpreted Needs

| **Posed Question** | **Response** | **Interpreted Need** |
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| What are we trying to accomplish with the glider? | Needs to be able to move underwater, | Glider mobility and survivability is a top priority. Varying water pressure does |

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| Payload? Modularity? | We want to see the glider first if you can add a payload that's great but the creation of the glider comes first then we can add payload | Payload is non-essential, but once the glider can operate as intended without a payload, payload can be considered. Extra space can be allocated to the glider for payload implementation. |
| What is the key scope of our glider? Efficiency, speed, stealth? | Efficiency, Speed, Mobility, stealth does not matter | Stealth is not relevant for the glider. Mobility and efficient motion should be the focus of the design. We interpret this to mean the glider should be able to traverse the maximum distance using as little energy as possible. |
| Energy Harvesting? Does the glider need to be able to recharge or generate power during operation? | It can that is completely up to you guys if you guys have the time to do it. | The glider can be designed to generate its own energy if needed. |
| Elaborate on trajectory optimization, path specific | The glider should be able to move in a straight line not | |

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| | It will also need to survive and not be affected by different water pressures | not damage the glider in any way. |
| Environment<br>· Deep water? Survive a tsunami? Hot/cold/salty waters? | Deep sea water and consider different temperatures and how the glider can perform | The glider can operate in shallow and deep water. The glider can effectively ascend and descend through these regimes. Deep water is defined as 5-6 feet deep. |
| Testing scenario? | Test it in different conditions like hot cold and warm water. Try different pressures as well and see how that changes the speed and also the trajectory of the glider | The glider is robust enough to handle salinity, temperature variation, and pressure while maintaining normal operations. |
| · Can it ride the surface, or must it be fully submerged? | It can ride the surface however we want the mobility of it to be completely submerged | The glider can operate in shallow waters near the surface while maintaining fully submerged. It can transition between the surface and submerged as needed. |

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| motion, waypoints, or other targets the glider should be able to get to and leave? | hard turning but it should be able to move underwater and travel a certain distance. | The glider can move in a straight line. Since it will be affected by ocean currents, some method of trajectory correction might be implemented. |
| What kind of simulations and models would you expect? | I would like to see the glider in maybe Creo or another modeling software on how it moves under water what are the speeds the glider is reaching? Can the glider move like an actual aircraft underwater? Can it turn? Things like that I would like to see in simulation and also I would like to see the material used and how does that affect the gliders performance. | The glider is constructed in a computer software where drag, velocity, adaptability, pressure, and other variables can be monitored and regulated. |
| How Boeing unique does the project need to be, or is working with third party | This is a Boeing only project you can get materials and such but this is an idea you | After further clarification, we can consult outside sources for manufacturing needs but |

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| companies on collaborative ideation and manufacturing allowed? | guys need to come up with on your own. | not design specifications. Design should be done by us alone. |

Interpreting the statements of the customer allows the team to translate the customer's ideas into tangible goals. From the statements the team concluded that the glider should be energy efficient, mobile, and able to withstand ocean conditions. In addition, it is assumed that the glider will be able to sense the surrounding pressure and temperature. The customer also emphasized the importance of computer modeling and requested models of the glider under certain oceanic conditions which can help to visualize its motion and verify the craft's design specifications.