

Customer Needs

The objective of this project is to develop a means to assist paraplegic divers. To develop a means for assisting paraplegic divers, two paraplegic divers and two dive instructors were interviewed to get a better understanding of the problem's paraplegic diver's face. During the interview process, it was determined that there are a variety of different issues that paraplegic divers encounter. The problems that the paraplegic divers encounter often depend on the divers' available movements. The diver's available movements are determined by what muscles the diver still has control over. The interviews from the paraplegic divers and dive instructors are summarized below in Table 1.0.

Table 1.0: Summary of interviews and interpreted needs

Question/Prompt	Customer Responses	Interpreted Need
1) Where do you typically go diving?	I like to go to reefs and sometimes springs.	The assistive device can operate in fresh and salt water.
2) How do you normally get in and out of the water?	I either pull myself with my arms until I'm in deep enough water to swim or have someone help drag me off the boat.	The assistive device operates normally after repetitive dragging against boat deck or sand surfaces (under the weight of the scuba diver).
3) How deep do you normally dive?	I have my advanced diving certification, so I regularly reach depths of around 100ft deep.	The assistive device has a safety pressure relief valve (if pressurized gas is used) and can operate under pressure.
4) Do you maintain your dive equipment regularly?	I get my regulators services and buoyancy compensator serviced whenever the dive shop that fills my air recommends.	The assistive device requires no more maintenance than standard scuba diving equipment (once a year or twenty-five dives).
5) What is a task you struggle with when you dive?	Getting in and out of the water with all my gear on is always a challenge for me and whoever is assisting me.	The assistive device doesn't hinder the diver

		getting in and out of the water.
6) What are some difficulties you encounter when training paraplegic divers?	Many of students have different styles of buoyancy compensators so training each student to control their trim and buoyancy comes with different challenges.	The assistive device is compatible with most vest/jacket flotation, back flotation, and horse collar buoyancy compensators.
7) What is something you feel would make diving easier for you?	Putting on my wet suit has always been very difficult, and it can be embarrassing for me to ask for help getting dressed.	The assistive device provides a means for the scuba diver to put on their wet suit by themselves.
8) If you had a device that you had to control in the water how would you like to operate it?	I would have to control something with my hands. I would like the controls to not be confusing because my hands are also my only means for propulsion.	The assistive device can be operated with the diver's hands and doesn't interfere with other pre-existing controls.
9) Do you go diving on vacations and do you bring your own equipment with you?	I have been diving on vacation several times. I have brought my equipment with me but only about half of the time because my gear takes up too much space to travel with on planes.	The assistive device is compact and portable
10) What are some of the water temperatures that you dive in?	I have been in water as hot as 85 degrees and as low as 43 degrees.	The assistive device operates normally under various temperatures it is exposed to, in and out of the water.
11) As an instructor, what do you see paraplegic divers struggle with the most?	I feel that paraplegic divers are unable to control their trim properly and are constantly needing someone to keep hold of them.	The assistive device helps control a diver's trim without needing the assistance of another diver.
12) As an instructor, why do you feel it is necessary for paraplegic diver's to not need assistance while diving?	Diving is a very freeing experience and is the one place that a paraplegic can feel free again. They should not need someone to be constantly holding onto them because that defeats the purpose of feeling free.	The assistive device is able to be operated by just the single diver and not need any assistance while in the water.
13) What issues do you encounter when trying to control your trim?	I mainly have issues with my legs dragging.	This assistive device allows assistance in not letting the diver's legs drag.

The responses in Table 1 were utilized to make the interpreted needs of paraplegic scuba divers. The interpreted needs will be added to by additional interviews and research. The customer

requirements will be comprised of the weighted interpreted needs categories, which will ensure that most of the paraplegic scuba divers' needs are met.