amount of heat transfer from the peripherals to the tank itself. Accomplishing these interpreted needs from our project sponsor allow us to have a successful design.

1.3 Functional Decomposition

1.3.1 Introduction to Functional Decomposition

A functional decomposition is created to simplify complex systems into smaller components and processes. This is accomplished by developing a list of major functions that the product must accomplish. The major functions for this project can be seen in the second column of the hierarchy chart (Figure 1). These major functions can be broken down further into individual actions that must be performed by each function. For this project we include store, insulate, communicate to user, and connect as the major functions to be performed.

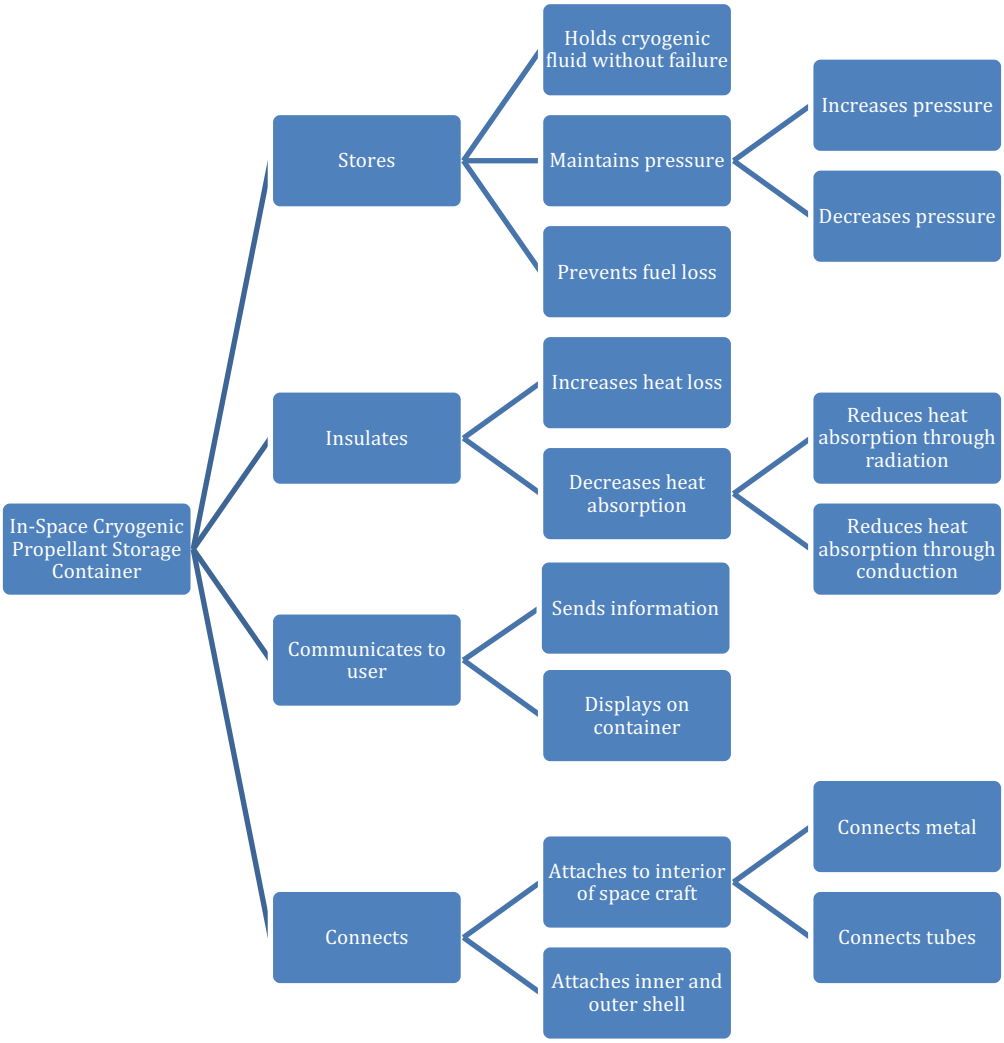

Figure 1: Hierarchy Chart

1.3.2 Major and Minor Functions

The store function is what physically holds the cryogenic fluid in the container. The tank must have the ability to hold fluids at a cryogenic temperatures without fracture in a space

environment, as well as on Earth. Maintaining the cryogenic temperature ultimately prevents fuel loss. It must also be able to expand and contract as fluid is emptied and filled into the container, as well as regulate the pressure. Insulate controls the amount of heat transfer coming in and out of the system. Heat absorption must be reduced so that the fluid can be maintained at the appropriate temperature for a longer period of time. Communicate to user allows the customer to view the detected pressure, temperature, and the amount of fluid inside the container. Connect attaches the container to the interior of the space craft using current state-of-the art struts and valves. It must remain stable in the spacecraft while it is not in use. This is especially true during lift-off. These functions work together to perform tasks as a system.

1.3.3 Action and Outcome

The In-Space Cryogenic Propellant Storage Container is a container designed for use by space companies to maintain cryogenic propellants in space at their respective temperatures for extended periods of time. For this to happen, the tank must have a way to control the magnitude of the temperature and pressure. In order to increase the amount of time that the pressure and temperature are controlled, the product must also be able to reduce the heat transfer and fuel losses through the system.

1.3.4 Cross-Reference Table

The following cross-reference table was completed by examining how each function impacts another. Some functions may only interact with one system but are still integral to the success of the project. In some cases, system integration can be performed to combine the major functions and make the system more efficient.

	Stores	Insulates	Communicates to User	Connects	
Holds cryogenic fluid without failure	x				1
Maintains pressure	x		x		2
Prevents fuel loss	x		x		2
Increases heat loss		x			1
Decreases heat absorption		x			1
Sends information			x	x	2
Displays on container			x		1
Attaches to space craft interior				x	1
Attaches inner and outer shell				x	1
	3	2	4	3	

Table 2: Cross-Reference Table

Some major functions are related through their shared minor functions. The functions of maintaining pressure and reducing fuel loss are important in storing and communicating with the user. In order to convey information, the storage must have a connected sensor that communicates to the user. All minor functions are related because they are all required to operate successfully to consider the entire system successful.