**Functional Requirements**

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| FR No. | FR Description |
| FR 1 | LaunchController will act as 1 of our 2 main controllers. It will be the main interacting object between our main and the launching sequence. The tests, launching, docking and program completion will happen here. |
| FR 2 | Supplies and Equipment will simulate real-world variables, influencing the weight and optimization of the launch. |
| FR 3 | Crew and Cargo are contained within the CrewDragon and/or Dragon depending on the allocated load. Both of these will have an effect on the weight and thus cost and optimization of the launch. |
| FR 4 | CrewDragon and Dragon are Spacecraft (through public inheritance). They will have a different algorithm each (through use of Strategy and Template Method patterns) to calculate the weight of themselves with their Cargo and/or Crew loaded, which will determine which Rocket to use and also the cost of the launch. |
| FR 5 | Spacecraft will consist of all the cargo and/or crew, it will be the sub-class best suited for its needs. |
| FR 6 | The FalconHeavy and Falcon9 are Rockets which own 1 or more Compositions, which define which phase they are currently in. Each will have their own base weight, as well as optimal limit to determine the best configuration to pair with the Spacecraft. They will also have a list of Compositions to communicate with these parts (through the Observer pattern). The different Rockets also have different phases, this complex structure to instantiate will be handled by an abstract factory pattern, using ConfigurationController. |
| FR 7 | The Composition mentioned (FR 6) consist of FalconCore, MerlinEngine and VaccuumMerlinEngine. These will need to be applied and used with Rocket, to represent the appropriate phase which the Rocket is currently in. |
| FR 8 | The OrbitalControl is the other main controller, which will be the main interacting object with any part of the launch in orbit. It is used for communication between User and StarlinkSatelite objects and also interacts through using patterns such as the Mediator and Command etc. |
| FR 9 | A User send 3 signals to operational satelites, being sending a message, connecting and disconnecting. This structure is maintained through use of the Command pattern and specific requests are handled by the correct satellite using the Mediator and Chain patterns. |

Falcon9 Weights:

* Base: 50
* Optimal limit: 300
* Under optimal limit: 1.0
* 0-20% over: 1.2
* 21-50% over 2.0
* 51-…% over : 5.0

Falcon Heavy Weights:

* Base: 80
* Optimal limit: 800
* Under optimal limit: 1.0
* 0-20% over: 1.2
* 21-50% over 2.2
* 51-…% over : 3.0

CrewDragon weight: 200

Dragon weight: 400

Weight Optimality = rocket base cost \* rocket total weight \* multiplier

This will be used to determine which configuration to use.