Use Case 2: Iniate Launch/Monitor Launch
Scope: Launch Simulator
Level: Flight Controller Goal, Astronaut Goal
Primary Actor: Flight Controller
Secondary Actor: Engineer/Technician
Related Use Cases: *Use Case 1: The Users shall monitor Pre-Launch Activities*
Stakeholders & Interrests:

- Flight Controller: wants
  - to Initiate Launch
  - to Monitor Launch Data for launch safety
    - Determine if a Launch Abort is needed
  - a Successful Lanch
- Astronaut: wants
  - a Successful Launch
  - to Monitor Launch data for launch safety
    - Determine if a Launch abort is needed
- Engineer/Technician: Wants to monitor launch data of their responsibility for launch integrity assessment: to advise the Flight Controller
- Administrator: wants a successful Launch
- Local and Federal Politicians: want
  - a successful Launch for campaign, re-election and other political purposes
  - a successful Launch for policy assesment for program funding and continuation
  - technical success for local and national pride

Pre-Conditions: All Pre-Launch Activities are complete: the Countdown is at Zero, there is no hold nor abort on the Countdown, the System indicates no errors in the Pre-Launch Data
Post-Conditions: The Trasistion out of Launch successful

Main Success Scenario:

Flight Controller	**System**
	1. Indicates Countdown at zero and ready to launch
2. Intiates Lauch	
	3. Directs Engines to ignite
	4. Transitions to Ignitiate Launch
	5. Returns confirmation of the engine ignition
	6. Monitors Engine Thrust Data
	7. Returns Engine Trust Data
	8. Repeats 5 & 6 until Engine Trust adequate to lift rocket
	9. Rocket ready to Launch
10. Launch Rocket	
	11. Execute the Launching Mechanism (Launches Rocket)
	12. Monitors Engine Thrust Data
	13. Returns Engine Thrust Data
	14. Monitors Rocket for Clearing the Launch Tower
	15. Returns Rocket's current height
	16. Repeats steps 10 through 13 until Rocket Clears Launch Tower
	17. Returns Rocket Cleared Tower
	18. Transitions to Launch upon Rocket Clearing the Launch Tower
	19. Informs of Transition
	20. Starts the Flight Time Clock
	21. Flight Time
	22. Launch Data
	23. Repeats 21, 22 throughout the duration of the Launch
	24. Performs Stage Separation
	25. Informs Stage Separation
	26. Repeat 24 & 25 for all Stages
	27. Upon Final Stage Separation Transitions out of Launch (Launch is complete)
	28. Alerts the Actors of the Transition

Alternative Flows:

4a.,5a. If the Engines do not ignite, then the System Alerts the Flight Controller of the issue, the Flight Controller aborts the laumch the System does not Transition to Ingnite Launch

6a-8a If, after an expected time for the Engine Thrust to be adequate enough to lift the Rocket and there is not enough Engine thrust to lift the Rocket, then the System issues an Engine Thrust Failure

10a If the Flight Controller aborts the Launch, the System will not activate the Launch Mechinism, all the actors are to follow their respective Launch Abort Procedures.

6b.-8b,12a,13a. If there is an Engine Thrust Failure, then the System alerts the Flight Controller of the Engine Thrust Failure. The Flight Controller aborts the launch.

18a In the event of a Launch Abort, the System will not transition to Launch

21a. In the event of a Flight Time Clock failure, the System will alert the Actors. The Flight Controller will initiate manually the Flight Time Clock and the Flight Time will be kept outside of the System

22a. The System alerts the Actors of any anomalous Launch Data.

22b. If the System assess any of that anomalous Launch Data poses a threat to the launch and/or lives of the mission crew, then the System advises the Actors to abort the Launch.

24a.,25a. If any of the stages fail to separate from the rocket–including the final stage, then the System alerts the failure to the Actors, the System does not transition out of launch (for final stage). Primary Actors abort the Launch. The System reflects the abort status.

Special Requirements:

- The Launch Initialization is from when the Flight Director Initiates the Launch Sequence to when the Rocket Clears the Launch Tower. The Flight Director has the ability to Abort the Lauch Initialization. Special Abort Procedures must be developed and followed by the Flight Controller, and the Astronauts.
- Several factors and data points are required to determine if/when the Rocket is ready to Launch. The System will monitor all of these factors. All of these factors must be in a stable and exprected state before the System will advise on launching the Rocket.
- There is only one point of Decision for the Abort. That decision rests with the Flight Controller. Currently, the Flight Controller takes no advisement other than System Data.
- The Launch Mechanism will not release the delivery system (rocket) until enough lift thrust is built up.
- The Primary Actors have final authority on Launch Abort.

Technology & Variations List

* The Launch Initialization data can be viewed simultaneously, or chose to view selected Launch Initialization data, at the discretion of the Flight Controller.

* If the System is automated, then the System would determine when to ignite the engines, when to execute the Launching Mechanism, and make the decision to abort the Launch Sequence. The Flight Director would have final authority.

2a The Flight Controller can chose not to Initiate the Launch

Frequency of Occurrence: Almost continuoulsy. Based on the Frequency of desired Launches.

Open Issues:

- Need to create a list of the Lauch Data to monitor: needed for the decision for when to launch the Rocket
- What are the abort procedures?
- Consider shutting down the Rocket engines as part of the abort procedures
- If the Rocket engines are not capable of shutdown, consider other possible abort procedures
- Should the Astronauts have the ability to abort the Launch initialization?
- If the Engine thrust is inadequate to lift the to launch and the Flight Director does not executes the Launch Rocket procedure, should there be a System Override where the Launching Mechanism is not executed?